amateur radio

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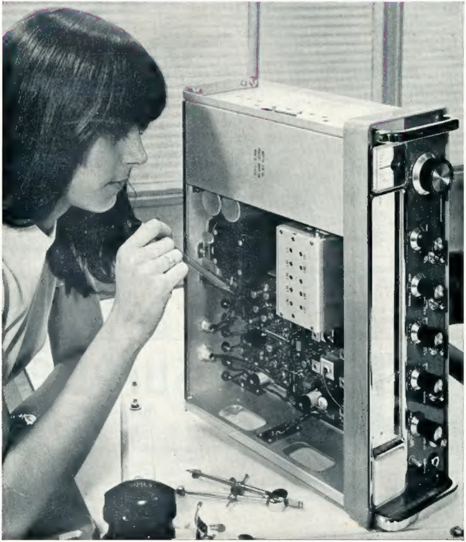

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COVER STORY

The Eddystone model EC990S is a modern fully transistorised UHF receiver for AM/FM operation in the range 230-870 MHz. Designed for fixed or mobile operation, this unit has applications in meteorological service, radio astronomy, aerial investigation and in radio laboratories. In addition to audio and video outputs, a low impedance output at the I.f. of 36.5 MHz. is provided to drive ancillary equipment. Further information is available from R. H. Cunningham Pty. Ltd.

FEDERAL COMMENT:

NOVICE LICENSING — AGAIN

The Federal Council at the 1970 Federal Convention divided equally on the question of whether or not the Wireless Institute of Australia should press for the introduction of some form of Novice licence in Australia. The Federal Council did, however, direct that the Federal Executive seek further information to be embodied in a report so that the question could be considered further. The Federal Executive sought the assistance of the New South Wales Division and accordingly a committee of that Division, under the chairmanship of Mr. Rex Black, VK2YA, was formed. The report of the committee was received by the Federal Executive on 1st April, 1971, copied and posted to all Federal Councillors on 2nd April—that is exactly one week before the Federal Council met in Brisbane for the 1971 Federal Convention. The report has received universal praise; indeed the Federal Council formally recorded its deep appreciation of the work of the committee.

Yet, the Federal Council decided to defer decision on the matter. I know that very many people were interested in this question. Perhaps some will regret the decision to make no decision at this time. Perhaps it could be seen by a few as evidence of a thoroughly negative attitude. To draw such inference is, however, to be less than fair. First, let us look at the report. It raises, I believe, all the issues relevant to Novice licensing clearly and succinctly. In requesting such a report, the Federal Council was seeking as much factual evidence as possible upon which a decision could be based. The report provides this information. I have found this report most helpful on one of the most complex and difficult topics that have been considered in recent years.

In brief, the report recommends that the W.I.A. should seek the introduction of a "Novice" type of licence in Australia. This is necessarily a value judgment. There is no single fact that points unequivocally one way or the other. For example, the two countries with the highest ratio of Amateurs per head of population in the world are the United States of America and New Zealand. One has—the other does not have—Novice licensees.

The report suggested, for discussion, that a Novice licence should be sought on the following basis:

1. A lower standard theory examination than that required for A.O.C.P. and A.O.L.C.P.
2. The same standard regulation examination as is required for the A.O.C.P.-A.O.L.C.P.
3. A five words per minute Morse test.
4. That the Novice licensee will use:
   (a) A crystal controlled transmitter.
   (b) Not more than 10 watts d.c. input.
   (c) C.w. only.
5. The same age limit would be imposed as is imposed for A.O.C.P. and A.O.L.C.P.
6. A limited term licence only would be issued.
7. The licence would take with it the right to operate fixed, mobile or portable.
8. Special call signs would be allocated to Novice licensees.
9. A character reference would be required before a Novice licence is issued.
10. The Novice licensee would be permitted to operate on the following bands:—
    1800 - 1860 KHz.
    3505 - 3525 KHz.
    7010 - 7050 KHz.
    21030 - 21150 KHz.
    28040 - 28200 KHz.

In addition, a number of other proposals were suggested. I have no doubt that this report will provoke spirited discussion. **That is exactly what it should do.** The report is printed as Appendix E to the Minutes of the Federal Convention. Your Federal Councillor has a number of copies. Please approach him for further details and please discuss the matter and express your view to your Federal Councillor and Divisional Councillors.

At the outset, I stressed the date the report was received by the Executive and circulated to the Federal Councillors. The committee, under Mr. Black, was appointed towards the end of 1970. It sought the views of many people and engaged in a volume of correspondence described by one Federal Councillor as "fantastic". That the committee achieved its object of producing a report prior to the Federal Convention is no mean feat. Perhaps, however, it is reasonable to ask whether the fact that a decision was deferred means that this effort was wasted. Emphatically, no. Formally, and particularly informally, the Federal Council engaged in a spirited and very deep discussion of the many issues involved. Had that report not been received in time for the Convention one of the most useful discussions that have taken place in recent years would just not have occurred.

The introduction of a Novice licence system raises many issues fundamental to our hobby—the very purpose of the Amateur Service, the relationship of one type of licence with another, the virtues of quality as against the virtues of quantity are all relevant. Then, what do we set out to achieve with a Novice licence? How do we best do it? Do we take any different view of the two types of licence we already have? These are all equally relevant questions before we finally decide—if we do—to seek a Novice type licence and, even if we do so decide, the conditions of issue of such a licence raise question after question. No, the deferring of a decision was not evidence of negative thinking—rather it was a tribute to a magnificent report that deserves the fullest consideration and appreciation of the depth of a problem that, whilst in the past has been contentious, has not before been considered so completely. The deferring of the decision also gives each member the opportunity to re-consider his views and to take part in the formulation of one aspect of the Institute's policy that will undoubtedly and fundamentally affect our hobby for the future—whichever way the decision goes.

Finally, the matter does not have to wait another year. Your Federal Councillors are in regular communication with one another and with the Federal Executive. A decision can be made prior to the next Federal Convention if it appears that the pendulum previously finely balanced between "for" and "against" moves clearly in one direction or the other, thus answering the question "whether". If the answer is "for" then the question "what?" (an equally complex question) must be answered. I believe, too, that given a concensus, that question, should it arise, can also be answered prior to the next Convention.

Mr. Black and his committee have made the way open for our organisation to make an informed decision on a topic that has troubled many people. A snap judgment would have pleased some, displeased others, depending which way it went. A considered judgment will, whichever way it goes, justify the enormous amount of work of the committee. This is a question that must fundamentally affect the future of our hobby. Please make sure that your voice is heard.

—MICHAEL J. OWEN, VK3KI,
Federal President, W.I.A.

HOME STATION ANTENNA FOR 160 METRES

Part Two—Vertical Polarised Antennas

J. A. ADCOCK, M.I.E. (Aust.) VK3ACA*

GENERAL

The basic medium frequency antennas are the quarter wave vertical (or Marconi) and the half wave vertical. An antenna having a better radiation in the horizontal direction is the five-eighth wave vertical, this behaves like half an extended double zepp. Both quarter wave and half wave verticals present a pure resistance load at the base. The quarter wave has a definite resistance of about 40 ohms which can be obtained from the formula. The half wave has a high resistance feed point at the ground. An antenna length other than a quarter wave or half wave has some reactive and some resistive component. The equivalent circuits of the loads of these antennas are shown in Fig. 3. In this article we are mainly considering antennas with a pole or leg length of less than a quarter wave and only verticals which are base fed against ground.

The quarter wave antenna when fed in series with the ground will be resistive only. For a short antenna the load can be looked on as a capacitance in series with a resistance. As the antenna is shortened the resistance will become smaller and the capacitive reactance will become larger (smaller capacitance). Because the effective series reactance becomes higher, the load requires a higher driving voltage, this voltage being largely out of phase with the current. In other words the load has a poor power factor.

This effective series reactance can be tuned with a variable series inductance, and when this is done the resistance of the load is presented to the transmitter, the value of which is equal to the radiation resistance plus the loss resistance. For a short antenna the radiation resistance reduces with the square of the length of the antenna.

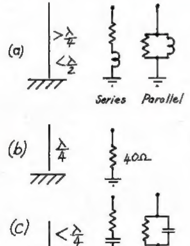

Fig. 3.—Showing the antenna together with the equivalent series and parallel circuit of the load when the antenna is fed in series with the ground.

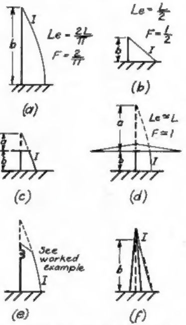

Fig. 4.—Showing the current distribution on some vertical antennas. (a) and (b) are used in the text to indicate electrical lengths of the component parts. L is the actual length of the radiating section. The effective length and the "form factor" are shown for some cases.

In some circumstances it may be desirable to consider the load as an equivalent parallel circuit as shown in Fig. 3. For a short antenna the equivalent parallel circuit will be one with a very high resistance and a high capacitive reactance. The equivalent series circuit is the one most commonly used. The conversion formula for parallel to series circuits is not given to avoid unnecessary complication. It is necessary to know the reactance to make the calculation. Series parallel conversion and reactance have been introduced later with references as an incidental.

As the antenna is made longer and approaches a quarter wave, the series reactance approaches zero or the parallel reactance approaches infinity, and the resistance in both cases approaches 40 ohms. As the antenna is lengthened beyond a quarter wave the series resistance increases and the series reactance becomes inductive. The series inductive reactance again approaches zero as the antenna length approaches a half wave and the resistance becomes a high value.

The distribution of current on a vertical antenna is shown in Fig. 4. The effective lengths of the antenna for the purpose of approximate calculation are also shown. Fig. 4a shows the current distribution for a quarter wave antenna, the distribution being approximately sinusoidal (Ref. 3). Fig. 4b shows the position for a short vertical. It will be noted that this distribution is approximately "triangular".

As pointed out already, a short antenna will necessarily have a low feed point resistance and therefore a large current. The driving voltage will also be high due to the high series reactance. An equivalent series circuit of a complete tuned short antenna is shown in Fig. 5. The constants are considered lumped. From the circuit it is obvious that if the losses are to be minimal the radiation resistance should be high and steps should be taken to reduce losses. In the antenna in Fig. 4b the current will be maximum at the bottom and zero at the top. As a result, current at the feed point is twice the average current and therefore the radiation resistance is low, also a large base loading inductance is required to tune the antenna.

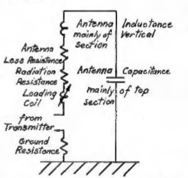

Fig. 5.—Showing a series equivalent circuit of the whole antenna. The main parts are shown lumped.

A much better distribution of current is achieved by "top loading", shown in Figs. 4c, d, and e. The top load can be made large enough so that the current in the vertical section is practically constant over the length considered. In fact the top can be made large enough so that the antenna will resonate.

Large capacitive top loading has the following advantages:

1. The current distribution in the radiating section is optimum, resulting in maximum radiation resistance.
2. Minimum tuning inductance is required.
3. The large capacitive top ensures minimum voltage stress to produce the necessary electrostatic field, hence minimum tendency to corona.

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Initially in this discussion the top is considered to be symmetrical and therefore would radiate very little since currents flow in opposite directions and produce a largely cancelled field.

A symmetrical antenna with a straight wire top is very ancient and goes under the name of "T". The top load, however, can take several other forms, e.g. an umbrella, several horizontal radials, a flat disk, an inductively loaded whip, a cylinder or a sphere. An antenna with a single top wire at right angles is known as an "inverted L". A "sloping antenna" is also a vertical and these will be dealt with in a separate section.

The top loading will have an effect on the antenna like an extra length of wire vertically (non-radiating). This equivalent effective vertical is shown as length "a" in Figs. 4c, d and e, and the vertical radiating section is shown as length "b". The current distribution over the real and virtual part of the antenna in all cases except Fig. 4f is close to sinusoidal (Ref. 3). The shortening effect of a tapering antenna is only illustrated here and is not analysed.

CALCULATIONS FOR VERTICAL ANTENNAS

Radiation resistance of a vertical antenna when fed in series with the ground is given by—

$$R_a = \frac{1580\ L_e^2}{\lambda^2} \quad \text{.... ....} \quad (1)$$

where L_e = the effective length of the antenna.
λ = wavelength.

Frequency	λ Metres	λ Feet	λ/4 Feet
1.8	166.7	546.8	136.7
1.825	164.4	539.3	134.8
1.85	162.2	532.0	133.0

Since we are considering the vertical component only any horizontal radiation resistance can be considered part of the loss. This value is usually small.

In the graphs given here the electrical length of the antenna is taken as $\lambda/4 = 1$. This was considered to be simpler for calculation than $\lambda/4 = 90°$. If calculations are made from tables, angular lengths would have to be used. In the examples given here no reference is made to velocity factor or end effect as these values should make a small difference only.

The effective length of the antenna and the form factor of the current distribution are as defined earlier.

$$F = L_e \div L$$
$$L_e = F \times L \quad \text{.... .... ..} \quad (2)$$

where F = form factor.
L = actual length over which the current distribution is being considered.

The vertical component of the antenna, the length over which the vertical current distribution is considered, is usually the gap between the top load and the ground.

Also—

$$F = \frac{\text{Average Current}}{\text{Base Current}} \quad \text{....} \quad (3)$$

$$\text{Average Current} = \frac{\text{Area under Current Distribution Graph}}{L} \quad \text{....} \quad (4)$$

In the case of a triangular distribution of current (Fig. 4b), the average current must be half that of the base current. Therefore it would radiate the same power as a wire of half the length carrying a constant current equal to the base current ($F = \frac{1}{2}$). In the case of Fig. 4d, the effective length is equal to the actual length ($F = 1$).

The form factor for a quarter wave is $2 \div \pi$, as shown in Fig. 4a. The true form factor for a radiating section of wire is given below.

From equations 3 and 4:

$$F = \frac{\int_{x=0}^{x=L} i\,dx}{L\,I}$$

where i = current at distance x from the end of the antenna.
L = length of the radiating section being considered.
I = base current.

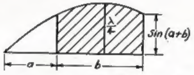

Fig. 6.—Illustrates the method used for equation 5.

Consider Fig. 6. The length "a" is the equivalent electrical length of the top (not necessarily the actual length) and length "b" is the electrical length of the radiating section. The current distribution in the wire is sinusoidal. From the equation the electrical length L must be taken in radians and equals length "b".

$$F = \frac{\int_{x=a}^{x=b} \sin x\,dx}{\text{radian } b \times \sin\ (a + b)}$$
$$= \frac{\cos a - \cos\ (a + b)}{\text{radian } b \times \sin\ (a + b)} \quad \text{.... ....} \quad (5)$$

a and b can be taken as the angular length $\lambda/4 = 90°$ and the figures taken

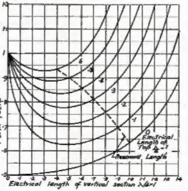

Fig. 7.—Curves of "form factor" against electrical length of the radiating section for various lengths of top load.

from tables. Note that if $(a + b)$ is greater than 90°

$\cos\ (a + b) = -\cos\ [180 - (a + b)]$.

Calculations from equation 5 are shown plotted in Fig. 7, and using equation 6 below, Fig. 8 was plotted.

Taking:

electrical length = $L \div \lambda/4$

and from equations 1 and 2

$$R_a = 98.75\ (\text{elect. length} \times F)^2 \quad \text{..} \quad (6)$$

Example for a simple quarter wave vertical:

$$R_a = 98.75 \times (1 \times 0.636)^2$$
$$= 39.9$$

It must be pointed out that this method of calculating radiation resistance is a simplified method and is only correct if the radiating section of the antenna is short. If it is near a quarter wavelength or longer the radiation resistance will be less by a small amount, however the results given by the formulae and graphs shown here should be sufficiently accurate within the range shown.

According to the formula, as the antenna approaches a half wavelength the radiation resistance approaches infinity. This is obviously erronious. If the total electrical length of the antenna is more than 1.4 of a leg length of a quarter wave, the formulae should not be used. The radiation resistance at the base of a half wave vertical cannot be accurately calculated but would be in the order of several thousand ohms.

A choice of methods for determining the form factor of the current distribution on an antenna has been given and these are summarised as follows:

1. If the current distribution conforms nearly to the standard forms shown in Fig. 4, these may be applied. F for a short vertical = 0.5 and F for a heavily loaded vertical = 1, the latter may not be sufficiently accurate on 160 metres.
2. If the current distribution curve is known, equations 3 and 4 can be applied and the areas under the current curve determined graphically or by measuration.
3. By application of the graphs or equation 5.

Effective Electrical Length of Top Load

This matter created some discussion as some authorities state that in the case of a "T" the effective length is equal to half the length of the top, that is, the "inverted L" section only and other authorities seem to leave the matter open.

The following would appear to be correct (Ref. 4):

1. With an "inverted L" the effective electrical length of the top is equal to the actual electrical length.

2. The electrical distance of the point being considered on the antenna from the current or voltage point (virtual or otherwise) is dependent upon the reactance component at that point.

3. The antenna can be considered as a wire with approximately 600 ohms characteristic impedance.

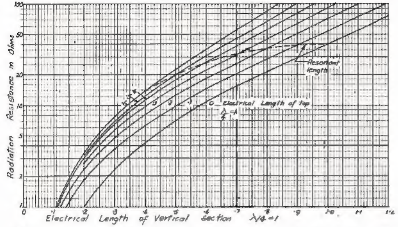

Fig. 8.—Radiation resistance of a vertical against height for various equivalent lengths of top load.

4. The no-load reactance curve for an unloaded 600 ohm line is near enough to correct except close to the voltage loop.

5. At the junction of the "T" the reactance load of each half will add in parallel to produce a reactance of half that of the individual line.

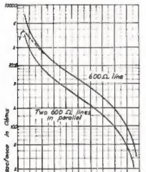

Fig. 9.—Curves for the open circuit capacitive reactance of a 600 ohm line or antenna. The lower curve represents the reactance when two lines are joined in parallel, such as the junction at the top of a "T" antenna. The short dotted curve at the top left shows the deviation in effective series reactance when the line is loaded with an s.w.r. of 12. For higher s.w.r.'s the deviation would be even less.

Fig. 9 has been drawn based on wire and two wires in parallel. (The mutual capacitance and inductance between the wires was not taken into account.) From these graphs, Fig. 10 was plotted to determine the equivalent electrical length of two lengths of wire (a "T" top).

Efficiency of Antenna

The radiation resistance of the antenna is dependent mainly upon the configuration and not on the loss resistance. The actual resistance of the load of the antenna will equal the radiation resistance R_R plus the loss resistance R_L.

Power radiated $= I^2R_R$

I = the current at the feed point.

Power input to the antenna $= I^2R$

R = the total resistance of the load

$$R = R_R + R_L$$

Since R is an unknown quantity

$$R = W \div I^2 \quad \ldots\ldots (7)$$

W = power input to antenna.

The power input to the antenna can be estimated from the final input. For a class C amplifier, 70% efficiency is reasonable. For a sideband rig, the manual should give sufficient information to estimate the power output.

Radiation efficiency of antenna

$$= \frac{\text{power radiated}}{\text{power input to antenna}}$$

$$= \frac{I^2 R_R}{I^2 R}$$

$$= \frac{R_R}{R} (\times 100\%) \quad \ldots\ldots (8)$$

R_R is found from graphs or calculation and R is found from equation 7. It is possible to use a Q meter or a bridge to obtain the load resistance but these were found to have certain difficulties as referred to in the discussion. The r.f. ammeter should be of the thermocouple type and should be checked against an ammeter at 50 Hz.

It may be useful to obtain the loss resistance.

$$R_L = R - R_R \quad \ldots\ldots (9)$$

In a grounded vertical antenna, R_L will be mainly ground resistance.

Fig. 10.—The length of one leg of the top of a "T" is plotted against the length of a single wire which would have the same effect.

Worked Example

A "T" antenna is 45 feet high and has a 66 ft. flat top. With 100 watts input to the final the antenna current is 1.8 amps.

Electrical length of half top ($\lambda/4 = 1$)	= 0.245
Equivalent electrical length of top (Fig. 10)	= 0.43
Electrical length of vertical section	= 0.332
Form factor (Fig. 7)	= 0.86

From equation 6

$$R_R = 98.75 \times (0.86 \times 0.332)^2 = 8.0 \text{ ohms.}$$

From equation 7

$$R = \frac{100 \times 0.7}{1.8^2} = 21.2$$

Efficiency of antenna $= 8 \div 21.2 = 0.38$ or 38%

$$R_L = 21.2 - 8.0 = 13.2 \text{ ohms}$$

probably mainly ground resistance.

THE CENTRE LOADED VERTICAL

The effect of an inductance in a vertical is to increase the capacitance loading of the top from the point of view of the bottom, Fig. 4e. In other words, the top is made to look larger. The top carries maximum voltage to provide the electrostatic field whereas the bottom section carries maximum current to provide the magnetic field. As well as a top whip the loading coil can be placed below any other form of top of small dimension.

The method has its main application where space is limited and the top is small. It is not as satisfactory as a large capacitive top load. While it does make the current and voltage distribution on the antenna more satisfactory (resulting in a higher radiation resistance), it does add extra losses into the circuit. The tendency to corona is increased.

The inductance of the coil will be much greater to tune the antenna to resonance at the centre than at the base and therefore the coil will be more lossy. Care should be taken not to tune the antenna over resonance or the coil may become very lossy. The best compromise is some centre loading and some base loading. Modern practice appears to be to keep the centre loading coil long and thin to reduce common mode radiation loss. For idealised cases of current distribution, the radiation resistance can be calculated from equations 3, 4 and 6.

The centre loaded whip as well as the helical whip have their main application to portable and mobile, but these applications are not discussed here.

Worked Example

Example 1.—A centre loaded whip has a total height of 35 ft. The distance from the base to the coil is 25 ft. and from the coil to the tip of the whip is 10 ft. Current was measured at the base of the antenna as 1.5 amps. and at the junction between the lower part

and the coil as 1.0 amp. What is the radiation resistance?

From equations 3 and 4

$$F = \frac{\frac{(1 + 1.5)}{2} \times 25 + \frac{1 \times 10}{2}}{35 \times 1.5}$$

$= 0.69$

Total electrical height $= 0.259$.

From equation 6

$R_R = 98.75 \ (0.259 \times 0.69)^2$

$= 3.17$ ohms.

In the above the current distribution curves were taken as straight lines. If you don't believe that the ammeter can be inserted between the vertical section and the coil, then consider this problem.

Example 2.—In the antenna in Example 1, it was found impossible to insert the ammeter two-thirds of the way up, but it was observed that 38 micro-henries were required at the base to bring the antenna to resonance. What is the radiation resistance? (Solution at some future date if requested.)

METHODS OF FEEDING

When the antenna is series fed, methods of tuning the antenna depend upon the type of load expected. For efficiency it is desirable to use the minimum tuning circuit possible and this is usually a single variable inductance in series with the antenna capacitance. When the antenna is tuned by a series circuit the effective series resistance of the antenna will be presented as a load to the transmitter.

Circuit Fig. 11a is used where the antenna is shorter than a quarter wavelength. Since a short antenna has a low resistance, the tuning circuit of the transmitter must be adequate to handle this. The coupling capacitor of the pi of the final tuning should be large to prevent overcoupling between the two tuned circuits. Overcoupling could result in harmonic radiation and makes tuning difficult. Circuit Fig. 11c is used where the antenna is over resonant—effectively more than a quarter wavelength. Where the antenna is close to resonant it may be either slightly inductive or capacitive. If the antenna is slightly capacitive, this is simply tuned by only a few turns of inductance, but if the load is slightly inductive a small capacitive reactance is required and hence a very large capacitor. The circuit of Fig. 11b is probably the best to use here. Also, circuit Fig. 11b may be used where no variable inductance is available.

Figs. 11d and 11e are parallel tuned circuits in which the antenna load is effectively in parallel with the tuned circuit. To understand this it is best to consider the effective parallel circuit of the load, Fig. 3. Here the effective parallel resistance is high and the coil behaves as a matching transformer. (It should be realised that there are several ways of looking at these circuits and whether you consider it as a circuit with low series resistance or with a high parallel resistance is a matter of convenience.)

These circuits are particularly applicable where the antenna tuning unit is remote from the transmitter and/or where it is necessary to match into a line. Other arrangements such as pi coupling may also be applicable.

Shunt feeding the lower end of the antenna has some application where the antenna is permanently connected to the ground, Fig. 11f. The antenna is fed with something like a gamma or a half delta match. It is suggested that this method, while satisfactory with a near resonant antenna, could be difficult with a shortened antenna. Large circulating currents would be present in the closed loop of a non resonant antenna which would reduce efficiency and make tuning difficult.

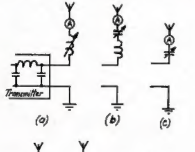

Fig. 11.—Illustrating various methods of feeding and tuning.

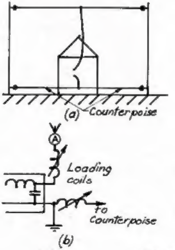

Fig. 12.—Methods of tuning a counterpoise.

EARTHING AND COUNTERPOISING

The most lossy part of a short vertical antenna is the ground. Ground resistance can be reduced by the use of buried earth radials. Unless these are extensive, they are nowhere near as effective as a counterpoise. If we consider the antenna top load as one plate of a capacitor and the ground as another, by using a counterpoise we replace the ground plate with a copper wire.

The counterpoise can be a large web of wire insulated from the ground, but a simple "T" wire directly beneath the top load will produce considerable improvement. If the counterpoise is connected direct to the ground the antenna current will probably drop, indicating a loss rather than an improvement. The counterpoise must be tuned (Figs. 12a and 12b).

A counterpoise can be tuned by a variable inductance or variometer in series with the counterpoise and ground and in this mode it will be parasitic. The loading coils for the aerial and counterpoise must be adjusted alternately to obtain maximum aerial current. When correctly adjusted, the earth current should be small and the aerial current and counterpoise current similar. In practice an ammeter in the ground and counterpoise are unnecessary. Some other methods of tuning are shown in Figs. 12c and 12d which, when tuned correctly, should give zero ground current. These circuits are more difficult to tune than the parasitic counterpoise.

REFERENCES

3. Radio Engineers' Handbook, Terman, p. 773.
4. Radiotron Designers' Handbook (fourth edition). Reactive component of impedance, p. 903.

☆

Correspondence

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

MUNICH OLYMPIC DIPLOMA (M.O.D.)

Editor "A.R.," Dear Sir,

I have been asked by Heiner DJ4KU and Maxie DJ4YL Ballinger, of Munich, West Germany, to pass on information about a certificate called the Munich Olympic Diploma (M.O.D.). The rules for which are as follows:

"All contacts with stations in Munich from January 1, 1970, 0000 GMT to 2400 GMT the day of the official closing of the Olympic Games 1972 will count for this award. Munich stations are the members of the DOKs C09, C11, C12, C13, C18, C30. Contacts with Munich Amateurs count:

for	DL/DJ/DK	Europe	DX
phone	2 pts.	4 pts.	6 pts.
cw/rtty	4 pts.	8 pts.	12 pts.

"Class I., 250 points; Class II., 200 points; Class III., 100 points.

"Mode: cw/phone/mixed. Bands: 160, 80, 40, 20, 15, 10, single band or mixed. The same station may be worked once per band and year. Fees: U.S. $1.00 or 10 IRC. Send a list of the QSO details certified by two licensed Amateurs to: E. Misera, DJ8ZU, 8 Munchen 13, Keuslinstr. 6."

If DX operators who are interested in working for this award pass details of their call signs and anticipated operating times, days or dates and bands to me I will pass it on to my contact in Munich.

Incidentally, DJ4KU is blind, and as a consequence obtains a great deal of fun from Amateur Radio.

—S. T. Clark, VK3ASC.

A SOLID STATE F.M. TRANSCEIVER—SOME AFTER-THOUGHTS

By G. L. C. JENKINS,† VK3ZBJ, and H. L. HEPBURN,‡ VK3AFQ

Since the publication of an f.m. receiver design in the March 1971 issue of "A.R." and that for a companion transmitter in the April 1971 issue, some developments have taken place which may be of interest to readers.

ALTERNATIVE POWER TRANSISTORS

The transmitter design specified the use of a Motorola 2N5589 in the driver section and a Motorola 2N5590 in the p.a.

Varian P/L. of 679 Springvale Road, North Springvale, Vic., 3171 (and 38 Oxley Street, Crows Nest, N.S.W., 2065) suggested that their range of C.T.C. power devices made by the Eimac division of Vairan in the U.S.A. might operate well in the circuit. Varian kindly provided a set of devices for trial.

A C.T.C. B3/12 was used in the driver section instead of a 2N5589 and gave somewhat better results. No changes were necessary either to board layout or component values. Used as an output stage on its own, the B3/12 gave well over 2 watts of output power for 70 mW. of drive. It would appear that the B3/12 can be used in the circuit as a direct replacement.

A C.T.C. B12/12 was used in place of the 2N5590 in the p.a. proper, but some component values needed changing. These changes are detailed below. After component optimisation, 15 watts of output were obtained from a 13.8 volt supply rail with 2 watts of drive—a considerable improvement over the 2N5590. At 15 watts out the total current drawn by exciter, driver and p.a. was 2.0 amps.

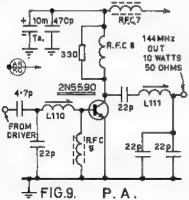

FIG.9. P.A.

Referring to Fig. 9, the following component changes are necessary to use the C.T.C. B12/12 in place of the 2N5590:—

(a) The series input capacitor is increased from 4.7 pF. to 6.8 pF.
(b) The 22 pF. capacitor between the input end of L110 and earth is reduced to 10 pF.
(c) L110 is increased from 1¾ turns to 2¾ turns.
(d) RFC8 is changed to 6 turns of No. 20 tinned copper wire, ¼" i.d. and ½" long.
(e) L111 is changed to 3¾ turns.
(f) The 330 ohm load resistor across RFC8 is not needed.
(g) The total fixed output capacitance of 44 pF. (2-22 pF. capacitors) to 36 pF. (2-18 pF. capacitors).

The only physical difference between the devices is that the Motorola transistors have a 3/8" diameter case while the C.T.C. transistors have a 5/16" diameter case. Connections are the same.

As a further experiment a C.T.C. B25/12 was driven by the complete transmitter and gave 30 watts of output at 146 MHz. The layout was the same as the existing p.a. but component values were different.

CRYSTAL SPECIFICATIONS

Both transmitter and receiver use crystals in the series mode. With the transmitter especially, it should be noted that the trimming capacitor (and the variations in capacity brought about by the modulating process) are effectively in series with the crystal. When ordering transmitting crystals therefore, the supplier should be advised that they are for use in a series resonant circuit and that they should be calibrated with 25 pF. IN SERIES with the crystal and NOT (as is more normal) in parallel with the crystal.

INCREASING EXCITER D.C. EFFICIENCY

As presented, the current drain of the exciter centres around 70 mA. with perhaps ±10 mA. variation, depending on the spread of characteristics of the devices used.

This d.c. drain can be reduced to a mean value of 45 mA. for a constant r.f. output by some very minor modifications.

Firstly, the oscillator is removed from zener control and given the benefit of full supply voltage. Zener control is retained on the whole modulator section. The effect of this change is to increase the drive from the crystal oscillator. In turn, this increased drive causes the first two MPF121 doublers to saturate and "flat top".

Accordingly, the 47 ohm resistors in the sources of the MPF121 doublers need to be raised to around 330 ohms to bias back the MPF121s into an unsaturated condition. The exact value of source resistors for any individual case must be found by experiment. The simplest indication of arrival at the correct value is when the tuned circuits associated with each device tune sharply, there is a reduction in total current drain, and the output power remains constant. However the centre value of 330 ohms in each source suggested above will achieve a significant decrease in d.c. power requirements even if the maximum decrease is not achieved.

So far as the transmitter circuit board is concerned physical changes necessary are:—

(a) Cut the h.t. line between the crystal oscillator and audio sections and bridge the cut with a 1.0K resistor.
(b) Remove the original 330 ohm zener dropping resistor and replace with an RFC made by threading a single wire through a Neosid F29 slug.
(c) Transfer the zener diode to a position alongside the 22K modulator trimpot.

TRIMPOTS

The 1.5K and 22K trimpots used are the P.M.D. type made by Plessey/Ducon. They are obtainable from Radio Parts in Melbourne.

The mounting method favoured is to put three circuit board pins in the p.c.b. where the presence of the trimpot is required. The "legs" of the trimpot are bent back at an angle of about 45° and then soldered to the three pins in the board. The legs are bent in such a direction that the adjusting screw of the trimpot will face upward when the trimpot is mounted on the circuit board pins.

TRANSMITTER BASE CHOKES

The "lossy" ferrite rod specified for the base chokes of the driver and p.a. are made by modifying 2½ turn RFCs marketed by the Philips organisation and having the type number 43/2020/36700. As supplied, these chokes consist of 2½ turns of thin tinned copper wire wound through holes in a cylindrical bit of ferrite. The choke is modified so that it consists of two single strands of wire, one strand of wire through each of two holes.

Additional holes are drilled in the printed circuit board about 1/8" away from the choke mounting holes already indicated on the p.c.b. The (four) wire ends of the modified chokes are threaded through the p.c.b., the choke body held hard on the board, and the wires pulled tight before soldering into place.

CIRCUIT BOARD PREPARATION

Several instances have come to the notice of the authors where the printed circuit board, after drilling, has not been cleaned and protected against

(Continued on Page 12)

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THE CLASS C RADIO FREQUENCY AMPLIFIER

LECTURE No. 13

C. A. CULLINAN, VK3AXU*

The class C amplifier is used extensively in radio transmission and a good knowledge of its operation is essential.

By definition this is an amplifier in which the grid bias is appreciably greater than the cut-off value so that the valve plate current is zero when no alternating grid voltage is applied, therefore the plate current in a specific valve flows for appreciably less than one half of each cycle when an alternating grid voltage is applied.

The characteristics of a class C amplifier are high plate circuit efficiency and high power output.

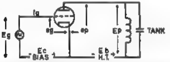
Because the plate current flows only over a portion of each cycle of the exciting grid voltage, the plate current takes the form of pulses and as described in Lecture 10 on Harmonics, the plate output contains considerable distortion.

Class C amplifiers are not used for audio frequency amplification, but when used as radio frequency amplifiers the plate current pulses are converted into sine waves in the amplifier's output circuit if it is properly designed. This action is known as the "fly wheel" effect.

In the discussion which follows, it is assumed that the grid and plate circuits of a class C r.f. amplifier are in resonance and are proportioned so that the radio frequency output of the amplifier will have minimum harmonics.

Also it is assumed that the amplifier has been neutralised if necessary, so that it is stable in operation.

Fig. 1 shows both the various voltage and current relationships which exist within the class C amplifier.



This drawing represents the various voltages and currents which exist within a class C amplifier. Note differences in symbols such as Eg and eg, Ep and ep.

The following nomenclature is used:

- Eb—d.c. plate voltage.
- Ec—grid bias voltage.
- Eg—input grid wave (exciting grid voltage).
- Ig—peak r.f. grid current.
- Ep—voltage across output load circuit (tank circuit).
- Ib—d.c. plate current.
- Ip—peak r.f. plate current.
- ep—output voltage, plate to cathode.
- ep min.—minimum plate voltage (Eb — Ep).
- eg max.—maximum positive grid voltage (Eg — Ec).
- θ—plate operating angle.
- θg—grid operating angle.

* 8 Adrian Street, Colac, Vic., 3250.

- Continuing the series of lectures by C. A. Cullinan, VK3AXU, at Broadcast Station 3CS for students studying for a P.M.G. Radio Operator's Certificate.

BIAS

In Fig. 1A Eg is the input voltage, assumed for purposes of simplicity to be a sine wave. This sine wave is impressed on the grid of the valve (between grid and cathode) along with the negative d.c. bias, Ec. This bias will be at least twice the value required for d.c. plate current cut-off. This bias may be obtained from a battery or other constant voltage source, from a grid leak, by the use of a resistor in the cathode of the class C amplifier valve or a combination of these methods.

In a communications continuous wave transmitter it is common to use a constant bias source and to key the transmitter in an earlier stage, thus the class C amplifier valve plate current will be cut-off during key-up conditions of signalling.

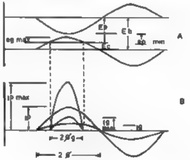


Fig. 1.

In A is shown a graphical representation of the voltages which exist within a class C amplifier. Note that the r.f. plate voltage Ep is 180 degrees out of phase with the grid exciting voltage Eg.
In B is shown the relative amplitudes and angles of the flow of currents within a class C amplifier. Particular attention should be made of the plate current pulse which is converted into a sine wave in the "tank" circuit as described in the text.

Theoretically the correct class C bias should be sufficient to reduce the plate current to zero when no excitation is provided at the grid.

Sometimes the keying will be used to add extra bias, beyond the value of the positive grid voltage so that the plate current is reduced to zero. This is known as blocked grid keying. It is frequently used if the oscillator is on the same frequency and may not remain stable in frequency if keyed, i.e. grid excitation is present at all times.

Some types of variable frequency oscillators are very stable and grid-blocked keying of the oscillator may be used. Usually grid blocking voltage is applied to the oscillator and the class C amplifier in such a way that the oscillator starts a fraction of a second ahead of the class C amplifier and stops just after the amplifier ceases to conduct. This sequence keying is done to prevent the transmission of "chirps" due to minute changes in frequency as the oscillator stops and starts

When the class C amplifier is used in the plate modulated service for telephony it is usual to employ grid-leak bias, with a small amount of cathode bias as well.

Continuing with Fig. 1A, the a.c. voltage on the plate (Ep) is superimposed on the d.c. plate voltage (Eb). This is 180° out of phase with the grid voltage (Eg).

Grid current flows in the grid circuit as soon as the positive portion of the exciting grid voltage equals the grid bias and plate current then starts to flow.

As the positive portion of the exciting grid voltage continues to rise, so does the plate current until the maximum exciting voltage is reached.

Then this voltage starts to fall and the plate current does likewise to the point where it becomes zero again as the positive exciting voltage reaches the same value as the negative grid bias.

During the rest of the exciting voltage cycle and the beginning of the next, no plate current will flow.

Thus for a sine wave input to the grid the signal in the plate circuit will be in the form of pulses.

This is shown in Fig. 1B which illustrates the relative magnitudes and angles of currents flowing in the circuit. This figure should be studied carefully.

As mentioned earlier, the pulses in the plate circuit will produce a considerable number of harmonics.

To convert these pulses to sine waves the output or "tank" circuit of the amplifier must have a large circulating current (r.f.) and to obtain this it is necessary to have a tank circuit with the proper Q or ratio of k.v.a. to k.w., that is the ratio of volt-amperes in the tank circuit to the d.c. plate power input.

For good harmonic reduction this ratio should be at least 12, although some designers might aim for ratios between 15 and 25.

"FLYWHEEL" ACTION

The "flywheel" action of the tank circuit may be explained as follows:

For ease in understanding this, assume that the output "tank" circuit is in the form of a simple parallel tuned circuit.

When the a.c. exciting grid voltage (Eg) goes positive, plate current (Ip) flows in the "tank" circuit, being superimposed on the d.c. plate current, if the d.c. is fed through the inductance of the "tank".

The a.c. plate current (Ip) flowing in the "tank" circuit produces an r.f. voltage across it, which charges the "tank" condenser, because in our dis-

cussion we are dealing with radio frequencies, not audio frequencies.

Remember, too, from elementary theory that when current flows in a circuit it will produce a voltage across that circuit.

At the moment that the exciting a.c. voltage (Eg) starts to go negative, the condenser of the "tank" circuit starts to discharge towards the plate or anode end of the "tank" circuit to charge the other side of the "tank" condenser through the "tank" inductance.

When the exciting a.c. voltage (Eg) is negative no a.c. plate current (Ip) flows because the valve is cut off, but the "tank" condenser continues to discharge in the opposite direction through the "tank" inductance to charge the other side of the "tank" condenser.

This completes one cycle of the r.f. output and explains how an r.f. pulse in the anode circuit becomes a sine wave in the "tank" circuit.

This explains why it is possible to use a single valve or paralleled valves as an r.f. amplifier in either class C or class B and obtain a sine wave output.

This cannot be done with audio frequencies.

Fig. 2 shows the wave forms of the voltages and currents in a class C amplifier, both unmodulated and modulated. These have been drawn to approximate the conditions which exist in the class C output stage of a 2 kw. broadcast transmitter, but are typical of all class C amplifiers.

RATINGS OF VALVE

In working with class C amplifiers it is desirable to operate within the conditions set down by the valve manufacturer. Any attempt to exceed the published ratings will usually result in short valve life.

Usually two sets of ratings are published—the first known as C.C.S. means Continuous Commercial Service and is the data used for the design of transmitters which operate more or less continuously. I.C.A.S. is the term used for the second set of ratings and means Intermittent Commercial and Amateur Service. These ratings have been devised on the basis that in I.C.A.S. the users will take a long period of time to obtain the same use or life from a valve that is obtained by a user under the C.C.S. rating and this is the reason that the I.C.A.S. ratings are higher than for C.C.S.

To illustrate this, here is some data taken from an R.C.A. valve data sheet for valve type 833A:—

Service: R.f. power amplifier or oscillator, for class C telegraphy or class C f.m. telephony. Forced air cooling.

Typical Operation:	C.C.S.	I.C.A.S.
D.c. plate voltage	4,000	4,000 V.
D.c. grid voltage	—200	—255 V.
Peak r.f. grid voltage	375	415 V.
D.c. plate current	450	500 mA.
Power output (approx.)	1,440	1,800 W.

If a class C r.f. amplifier is to be modulated then it is necessary to reduce the ratings from those shown above to prevent damage to the valve.

Service: As a plate modulated r.f. amplifier for class C telephony, the data becomes (forced air cooling):

Typical Operation:	C.C.S.	I.C.A.S.
D.c. plate voltage	3,000	4,000 V.
D.c. grid voltage	—300	—325 V.
D.c. plate current	415	450 mA.
Power output (approx.)	1,000	1,500 W.

The ratings for natural air cooling are considerably reduced from those for forced air cooling.

The above data shows that for C.C.S. class C plate modulated telephony the d.c. plate voltage has been reduced from 4,000 volts to 3,000 volts and the approximate power output drops from 1,500 watts to 1,000 watts. Also notice that for frequency modulation the C.C.S. power output is approx 1,440 watts. This is because for f.m. the carrier power remains constant whereas for a.m. it varies with modulation as explained previously.

Here at 3CS we operate our class C modulated amplifier with four 833A valves in parallel, under C.C.S. ratings.

Examination of the valve life cards, recorded over 15 years, shows that the average life of an 833A valve is 10,000 hours. This includes failures from all causes. The manufacturers guaranteed valve life is 1,500 hours.

In many cases the valves are withdrawn between 10,000 and 12,000 hours use because the harmonic distortion at 3 KHz. to 5 KHz. increases to the allowable limits or because emission of the cathode falls off so that full modulation is not possible on positive peaks (lack of positive peak emission), resulting in asymmetrical modulation.

This falling off of positive peak emission is detected with an amplitude modulation meter and a low distortion audio frequency oscillator, usually long before the modulated amplifier plate current meter shows a reduction of plate current brought about by severe loss of emission.

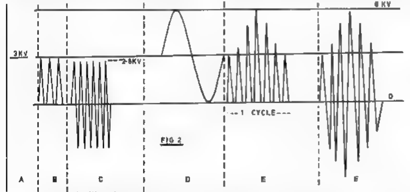


Fig 2.—Wave forms existing in a class C amplifier in a typical transmitter

A.—D.c. plate voltage unmodulated, 3 KV.

B.—R.f. current pulses in the plate circuit, unmodulated (peak 1 0 amp.).

C.—R.f voltage across the "tank" circuit. The current pulses shown in B have been converted into sine waves in the 'tank' circuit because of the "flywheel" action of the "tank", as explained in the text. This drawing is of the voltage that has been produced across the "tank" circuit. By calculation it is 2.8 KV for this particular transmitter.

D.—Modulated plate voltage. This comprises the audio frequency modulating voltage superimposed on the d.c. plate voltage. That is, above the 3 KV axis, B plus a.c. modulation voltage, so that peak positive voltage rises to 6 KV. Below the 3 KV. axis, B minus a.c. modulation voltage, so that peak negative voltage drops to zero.

E.—R.f. current pulses in the plate circuit during modulation. The peak positive pulse rises to 2 amps and on the negative half of the modulating wave the current drops to zero.

F.—The modulated voltage produced across the "tank" circuit because of the "flywheel" action. Because of the small size of the drawings it is not possible to show the r.f. current pulses and resultant sine wave voltages as sine waves, this being the reason that they are drawn in the manner shown.

W.I.A. D.X.C.C.

Listed below are the highest twelve members in each section. Position in the list is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total D.X.C.C. credits given, including deleted countries. Where totals are the same, listings will be alphabetical by call sign.

Credits for new members and those whose totals have been amended are also shown.

PHONE

VK5MS	319/343	VK4FJ	287/307
VK6RU	317/342	VK4TY	284/288
VK3AHO	311/326	VK2APK	281/287
VK6MK	304/324	VK2AAK	274/279
VK4KS	303/317	VK3TL	271/277
VK5AB	297/314	VK4UC	270/270

New Members:

Cert. No.	Call	Total
117	VK3XM	200/201
118	VK3APU	114/114

Amendments:

VK3ZE	268/271	VK3AMK	230/230
VK4PX	259/260	VK4XJ	159/163

C.W.

VK2QL	303/326	VK3NC	274/300
VK3AHQ	301/315	VK3XB	270/287
VK4FJ	290/315	VK3ARX	270/279
VK2AGH	282/295	VK6RU	268/269
VK3YL	281/298	VK4TY	259/272
VK2APK	280/288	VK3TL	255/260

New Member:

Cert. No.	Call	Total
96	VK4KX	178/178

Amendments:

VK4UC	176/177	VK4XJ	139/145

OPEN

VK6RU	318/342	VK4KS	303/322
VK2AGH	314/334	VK2EO	302/325
VK2VN	310/328	VK3ARX	299/308
VK4SD	306/321	VK2APK	298/309
VK4TY	306/321	VK4EJ	298/323
VK6MK	304/324	VK2SG	294/300

New Member.

Cert. No.	Call	Total
133	VK3APU	116/115

Amendments:

VK4UC	293/294	VK4XJ	194/201
VK4PX	270/273	VK2AXK	122/125

F.M. TRANSCEIVER

(Continued from Page 9)

oxidation. The effect of these omissions has been to lead to suspect soldered joints and the near impossibility at any later stage to change components, or in any way carry out modifications or repair work.

It is strongly urged therefore that any printed circuit board be cleaned and protected before any soldering work is carried out. This comment does not, of course, apply to boards which have been solder rolled during manufacture.

The simplest way to clean copper circuits boards after drilling is to polish with fine steel wool such as "Jex". Immediately after polishing the clean copper should be given a light coating of clear lacquer. The one recommended is the "metal finish clear" "Spray Pak" put out by Balm Paints under the "Dulux" trade mark.

It is quick drying and (provided a heavy application has not been given) the thin film of lacquer can be soldered through with impunity. Boards treated in this way by the writers are still clean and unoxidised after two years' service and still accept solder as well as the original clean copper.

TUNING UP THE EXCITER

As an alternative to the procedure set out in the April 1971 "A.R." for tuning up the oscillator and doubler stages of the exciter, the following simplified procedure is offered.

It is based on the fact that as the crystal comes into oscillation drive will be applied to the first MPF121 doubler, causing its operating current to rise. As the first doubler starts to put drive into the second doubler, it, in turn, will draw more current. In both doublers there is a by-passed source resistor, the voltage drop across which will rise as drive increases.

Thus the alternative tuning procedure consists simply of putting a high resistance voltmeter or v.t.v.m. on, say, the 5-volt range, across the source resistor of the first MPF121 and adjusting the slugs of L101 and L102 for maximum voltage indication.

The process is repeated with the voltmeter across the source resistor of the second MPF121 doubler, this time adjusting the slugs of L103 and L104 for maximum indication.

It is still necessary to use some form of power meter or r.f. indicator to tune up the MPF121 amplifier.

SIGNAL SOURCE FOR RECEIVER LINE UP

The performance of the receiver is such that to obtain best results the signal level used for final lining up must be very low. Large signals (i.e. 2-3 microvolts or more) cannot successfully be used for final lining up since they cause the whole receiver to saturate.

In the absence of a signal generator with an accurate low level attenuator capable of going down to 0.2/0.3 microvolts, then the simple signal source described by Ron Higginbotham, VK-3RN in the December 1970 issue of "A.R." is recommended. Several people in the Melbourne area have made up this device using transmit crystals from existing carphones to provide the correct frequency.

If the coupling capacitor between the "High" and "Low" outputs is removed the amount of signal available from the "Low" output terminal appears to be suitable for final lining up of the receiver described.

NEW NEW

CALLING, EMERGENCY or SKED-MAKING FREQUENCY

7050 KHz.

Whenever you are in the shack and not operating, keep the receiver running on 7050 KHz.

NEW NEW

PROVISIONAL SUNSPOT NUMBERS

FEBRUARY 1971

Dependent on observations at Zurich Observatory and its stations in Locarno and Arosa.

Day	R	Day	R
1	77	15	69
2	76	16	66
3	68	17	62
4	80	18	68
5	65	19	87
6	73	20	91
7	75	21	91
8	60	22	100
9	37	23	87
10	37	24	98
11	62	25	93
12	50	26	69
13	63	27	68
14	60	28	71

Mean equals 71.5.

Amended Smoothed Mean for July 1970: 108.3.

AUSTRALIAN 2 METRE F.M. REPEATER DIRECTORY

The Australian development of f.m. repeaters has been along the agreed two-channel principle on Channel 1 (146.1 in and 145.6 out) and Channel 4 (146.4 in and 145.9 out). The simplex operation is National Channel B (146.0), Channel A (145.854) and Channel C (146.146). The system is based upon a 60 KHz. channel spacing with ±15 KHz. deviation.

OPERATIONAL REPEATERS

New South Wales:

Sydney—Channel 4, VK2BWI/R1, at Dural. Tx STC base, 40 watts to ground plane at 57 feet. Rx AWA MR20B, ground plane at 57 feet. Separation 250 feet. Coverage approx. 50 miles.

Central West (Orange) — Channel 1, VK2AOA/R1, at Mt. Canoblas. Note: Output is currently on 145.854 but this will be changed to 145.6 later this year. Tx AWA base 50 watts to ground plane. Rx AWA, ground plane, both 20 feet high. 400 yards separation. Coverage 100 miles.

Victoria

Melbourne—Channel 1, VK3WI/R1, at Carlton. Tx STC 128 base, 50 watts output. Rx is solid state STC 131 with equipment to prevent tx lock-up in event of rx failure. Both antennas are 45° ground planes, 250 feet high with a separation of 600 feet. Coverage approx. 25 m.

Geelong — Channel 4, VK3BGL/R2 located at Gnarwarre. Solid state home-brew equipment. Power output 25 watts. Tx antenna is a folded dipole (temporary) 50 feet up, and receiving is four stacked dipoles 100 feet high. Coverage approx. 60 m.

Gippsland—Channel 4, VK3WI/R3, temporary location at Mt. Bess (near Moe), future permanent location at Mt. Tassie. Solid state I.G.L. equipment, power output 4 to 6 watts. Both antennas are half wave dipoles, receiving 50 feet high, transmitting 35 feet high.

Queensland

Gold Coast—Channel 1, VK4EI/R2, at Mt. Tamborine. Solid state rx, tx home-brew, 25 watts. Antenna 5 x half wave collinear at 40 feet for tx and rx, 250 yards separation. Coverage 50 miles.

South Australia

Adelaide—Channel 4, VK5WI/R1, at Crafers. Tx TCA 1680 solid state 15 watts, rx TCA 1675/77 solid state. Antennas ground plane with small vertical separation. Coverage appears good.

REPEATER APPLICATIONS PENDING

VK2—Newcastle, Mt. Sugarloaf, Ch. 4.

VK6—South Eastern (Albany), Mt. Barker, Ch. 4.

VK7—Northern Tas., Mt. Barrow, Ch. 4. Hobart, Mt. Wellington, Ch. 1 or Ch. 3.

PLANNING STAGES

VK2—Central Coast, Gosford, Ch. 1. South Coast, Wollongong, Ch. 1. Murrumbidgee, Wagga, Ch. 1. Murray, Albury, Ch. 4.

VK3—North West, Mildura, Ch. 4. Central—Bendigo, Ch. 4.

VK4—Brisbane, Mt. Coot-tha, Ch. 4.

VK6—Perth, Tuart Hill, Ch. 4.

CHANNEL ALLOCATIONS FOR POSSIBLE FUTURE DEVELOPMENT

VK1—Canberra, Ch. 4.

VK2—North West, Mt. Kaputar/Narrabri, Ch. 1.
Far West, Cobar, Ch. 1.
Warrumbungle, Coonabarabran, Ch. 4.
Riverina, Griffith, Ch. 4.
Snowy Mts., Far South Coast, Ch. 1 or 4.
Mid North Coast, Port Macquarie, Ch. 1.
Far North Coast, Grafton, Ch. 4.

VK3—Western, Hamilton/Horsham, Ch. 1.
Northern — Shepparton/Wangaratta, Ch. 1.

VK4—No details known, Ch. 1.

VK5—No further plans at the moment.

VK6—At this stage all possible sites will use Ch. 4, e.g. Narrogin/Wagin; Bunbury/Busselton.

VK7—North West, Burnie/Devonport, same channel as finally used by Hobart.

PROJECT AUSTRALIS EXPERIMENTAL REPEATERS

The Australis experimental systems which have the blessing of the P.M.G. Department are designed as a service to enable Amateurs to adjust their equipment in preparation for AO6. It is emphasised that this is not part of the overall repeater plan.

It is possible that similar equipment will be constructed and forwarded to Divisions for use by Amateurs in other States.

One experimental repeater is located at Mt. Dandenong (Vic.). The input frequency is 145.76 MHz. and the output frequency is 432.3 MHz. I.G.L. equipment is used. The transmitter output power is 10 watts. Both antennas are quarter wave dipoles about 20 feet high with vertical polarisation in, and, temporarily, vertical polarisation out (this may be horizontal by the time this goes to press).

The other experimental repeater (also I.G.L. equipment) is located at Mt. Bess (near Moe, Vic.). The input frequency is 147.76 MHz. and the output frequency is 432.2 MHz. The transmitter output power is 4 to 6 watts. Both antennas are about 15 feet high. The receiver uses a 5/8 co-ax. dipole (vertical polarisation), and the transmitter a 42 element collinear (horizontal polarisation).

NEW CALL SIGNS

JANUARY 1971

VK2ZJF—J. C. Foster, 28 Avenue Rd., Mosman, 2088.
VK2ZUD—G. O. King, 15 Darnley St., East Gordon, 2072.
VK2ZUE—N. Fiora, 6 Pamela Pde., Emu Plains, 2750.
VK2ZUG—P. G. Walz, 46 Arthur St., Randwick, 2031.
VK2ZUH—J. E. Lukey, 1 Blenheim Pl., Glenfield, 2107.
VK2ZUI—R. C. Ecclestone, 3 Valerie St., Mt. Pritchard, 2170.
VK2ZUJ R. Carr, 275 Main Rd., Toukley, 2263.
VK2ZUK—D. J. Turner, 53 Amor St., Hornsby, 2077.
VK2ZUL—R. G. Swadling, 3 Grafton St., Lawrence, 2460.
VK2ZUM—G. H. Wilson, 60 River St., Kempsey, 2440.
VK2ZUN—E. S. Turner, 53 Amor St., Hornsby, 2077
VK2ZUR—E. M. van de Weyer, 101 Francis St., Bondi, 2026.
VK2ZVH/T—W. E. C. Bennett, 5 Kurn St., New Lambton, 2305.
VK3ASY—O. W. Guy, 34 Peter St., Box Hill North, 3129.
VK3BER—E. R. Russell, 164 Kangaroo Rd., Oakleigh, 3166.
VK3YFC—P. E. Lamb, 29 Panoramic Gr., Glen Waverley, 3150.
VK3YFD—F. M. Wrobel, 38 Hilton St., Glenroy, [redacted]
VK3YFE—S. G. Bushell, 36 Church St., Beaumaris, 3193.
VK3YFF—J. C. Buckley, 1/5 Carmichael St., West Footscray, 3012.
VK3YGN—J. W. Tomlinson, 66 Doncaster Rd., North Balwyn, 3104.
VK3ZUR—L. Janes, 50 Combermere St., Essendon, 3040.
VK4EI/R2—Gold Coast Radio Club, P.O. Box 588, Southport, 4215.
VK4II—F. J. Miller, 35 Gladstone St., Coorparoo, 4151.
VK4ZF/T—D. G. Hopkins, 11 Stephen St., Morningside, 4170.
VK4ZDJ—D. J. McWilliam, 2 Rosemary Ave., Mt. Isa, 4825.
VK4ZGE—G. E. Millward, 4 Mourilyan Rd., Mourilyan, 4858.
VK4ZHE—J. W. Heares, 233 Chapel Hill Rd., Kenmore, 4069.
VK5BW—A. F. Raftery, 33 Princess St., Croydon, 5008.
VK5UI—R. M. Morris, Flat 20, Hartman Ave., Modbury, 5092.
VK5WI/R1—W.I.A., S.A. Division Inc., Station: Hillcrest Rd., Crafers, 5152; Postal: G.P.O. Box 1234K, Adelaide, 5001.
VK5WS—W. D. Moulton, 18 Stanley St., Plympton, 5038.
VK5ZJI—C. J. Merry, 26 Davidson Rd., Elizabeth Vale, 5112.
VK5ZJQ—B. D. Norman, Station: Yahl, via Mt. Gambier, 5290; Postal: P.O. Box 177, Mt. Gambier, 5290.
VK6CV—R. W. Walker, 5/378 Scarborough Beach Rd., Doubleview, 6018.
VK6EM—S. E. Harrison, Flat 7, Mitchell Court, 15-17 Mary St., Highgate, 6000.
VK6ND—N. D. Stephen, 19 Leila St., Cannington, 6107.
VK6NW—D. W. Bridge, 109 Sig. Sqn., Vincent St., Leederville, 6007.
VK6ZCK—P. Canavan, 55 Grand Promenade, Bayswater, [redacted]
VK6ZDN—M. W. Dunning, 46 Holmesdale Rd., West Midland, 6056.
VK6ZJW—T. J. Wade, Station: O.T.C. (A), Carnarvon; Postal: P.O. Box 98, Carnarvon, 6701.
VK7ZBR—G. M. Ranft, 10 Lansdown Cres., West Hobart, 7000.
VK8JH—J. L. Hester, 84 Stanley Cres., Alice Springs, 5750.
VK8ZSW—R. H. Whelium, Esplanade Hostel, Esplanade, Darwin, 5790.

CANCELLATIONS

VK1JB—J. R. Watson. Not renewed.
VK1ZAB—G. W. Fletcher. Not renewed.
VK1ZEB—E. J. Barnes. Not renewed.
VK2AFI—P. E. Stayte. Not renewed.
VK2AIP—J. M. Burton. Not renewed.
VK2BSP—S. R. Pedemont. Deceased.
VK2ZIS—I. S. McKeachie. Not renewed.
VK2ZHI—G. A. Puckett. Not renewed.
VK2ZNG—A. R. Marjoram. Not renewed.
VK2ZTC—Sydney Teachers' College Radio Club, Not renewed.
VK3QZ—J. G. Colley. Not renewed.
VK3SV—J. F. Howarth. Deceased.
VK3ABW M. L. Weeks. Not renewed.
VK3AEP—E. K. O. Phillips. Not renewed.
VK3AWD—W. D. Mather. Transferred to Qld.

(Continued on Page 27)

VK-ZL-OCEANIA DX CONTEST, 1970 RESULTS

AUSTRALIA

Phone Section

Call Sign	80	40	20	15	10	Total
AX1GD	—	475	11160	8175	4435	24245
AX1BC	460	110	5665	2670	1150	10055
AX1AOP	—	—	2315	1340	1385	5040
AX2KM	425	2625	10390	7220	6040	26700
AX3APK	375	2985	10035	6275	5885	25555
AX2XT	—	—	11745	4815	3895	20455
AX3WC	—	—	5745	4655	2015	12415
AX2EB	—	—	6545	—	—	6545
AX2RX	270	—	2575	625	260	3730
AX2AOU	—	—	3700	—	—	3700
AX3BAZ	—	—	3420	—	—	3420
AX2BDN	—	—	2015	320	570	2905
AX2BNK	565	—	2315	—	—	2880
AX2AHH	—	—	—	—	2770	2770
AX3ABC	—	—	1495	—	—	1495
AX2UJ	575	—	—	—	—	575
AX3KM	—	—	11645	2675	2270	16750
AX3QV	445	—	3560	—	6405	10410
AX3ASU	—	—	9330	—	—	9330
AX3KS	—	—	3035	—	4795	7830
AX3ASV	575	110	1630	3265	[illegible]	6210
VK3BBA	—	—	5585	—	—	5585
AX3SM	—	—	—	5265	—	5265
AX3ABA	—	—	—	5155	—	5155
AX3ARV	—	—	2535	—	—	2535
VK3BCL	355	—	—	—	—	355
AX4LT	—	—	7370	3185	5910	16465
AX4FH	365	55	1675	5350	4865	12270
AX4VX	—	—	—	—	11615	11615
AX5SF	—	—	10720	—	—	10720
VK4EZ	—	—	7285	—	—	7285
AX4PJ	210	—	1635	1895	2960	6700
AX4LZ	[illegible]	—	3330	1745	525	5785
AX4XJ	—	—	—	—	3900	3900
VK4NQ	—	—	3575	—	—	3575
AX4UA	—	—	1190	1500	—	[illegible]
AX4QA	—	—	800	155	—	955
AX5WP	—	—	4105	5030	5275	14410
AX5FO	450	495	6075	2735	2330	12105
AX5ZZ	—	—	5650	—	—	5650
VK5ZX	—	—	1295	75	—	2045
AX6CT	165	2415	5545	6630	9640	24395
AX6RU	335	215	4020	2985	8260	15815
AX6HD	—	—	—	—	13625	13625
AX6LK	—	—	3330	2215	6320	11865
AX7GK	245	805	11340	6480	4275	23145
AX7JV	—	1500	—	—	—	1500
AX8AZ	—	—	1590	985	635	3310
AX9GN	—	355	10405	6915	7665	25340
AX9JL	—	—	2415	215	765	3395
AX9XI	—	—	1900	1865	3025	6790
AX9KS	—	—	6130	—	—	6130

C.w. Section

Call Sign	80	40	20	15	10	Total
AX3APK	385	1615	9415	6340	3090	20945
AX3GW	—	1560	8160	2460	3250	15040
AX3GR	210	960	8355	1525	2535	13585
AX3VN	935	1665	2840	3715	1060	10535
VK3QL	—	—	—	—	4555	4555
AX3RA	—	—	2925	245	—	3170
AX3BMB	—	—	2240	650	190	2480
AX3JY	—	—	790	—	—	790
AX2ABC	—	—	630	—	—	630
AX3OP	—	1935	6110	4415	—	12460
AX3AXK	—	—	—	3245	—	3245
AX3APN	1140	1960	6495	—	—	10025
(includes 425 pts. on 160 mx)						
AX3XB	810	—	—	—	5600	6415
VK3MR	—	5550	—	—	—	5550
AX3MJ	—	—	—	4655	—	4655
AX3ARV	—	—	4195	—	—	4195
AX3ABA	—	—	—	2255	—	2255
AX3RJ	—	—	—	—	—	515
(515 pts. on 160 mx)						
AX4VX	—	—	—	9915	—	9915
AX4UA	—	—	4175	2130	—	6305
VK4EZ	—	—	3330	—	—	3330
VK4KX	—	1260	2410	1160	395	5225
AX4XJ	—	—	—	—	4995	4995
AX5FO	—	350	8285	3450	—	12585
AX5FH	515	1760	7565	—	—	9840
AX5FM	—	—	—	4805	1985	6790
AX5BS	—	100	545	610	285	1640
(includes 100 pts. on 160 mx)						
AX6HD	1370	3415	10115	6405	6820	28125
AX6PL	110	110	3330	2585	1975	8110
AX7GK	1380	2030	8575	4675	2895	19755
AX8HA	—	—	1940	1580	3115	6635
AX9GN	—	—	—	—	9960	9960
VK9XI	—	—	5320	3310	345	8975

VK S.w.l. Section

	Phone	C.w.	Total
P. Vernon, L2250	10330	4500	14830
K. Ned, L2949			8565
C. Fergusson	410		410
R. Tremayne, L3285	12285	8510	20795
E. Trebilcock, L3042		4310	4310
K. Cunningham, L4104	5370		5370
P. Drew, L6021	8195		8195
R. Mutton (VK7)	16330		16330
R. Everett, L7043	10570		10570

NEW ZEALAND

Phone Section

Call Sign	80	40	20	15	10	Total
ZM1AKY	—	385	4170	8190	5150	17895
ZL1AGO	1350	1305	7935	3865	3330	18885
(includes 100 pts. on 160 mx)						
ZM1AIZ	530	785	5290	2855	2700	12160
ZM1AWF	530	—	2505	8715	—	11740
ZM1AAS	—	—	10630	—	—	10630
ZM1AVO	—	—	—	8425	—	8425
ZM1AMM	—	—	4370	1410	—	5850
ZM1ARO	—	—	1740	—	3650	4890
ZM1ACW	—	3970	—	—	—	3970
ZM1TB	—	—	—	1305	825	3130
ZM2AVY	—	—	9425	1320	—	10745
ZM2QK	—	—	6295	1315	—	7611
ZM3CD	—	—	—	—	6900	6900
ZM3BCX	—	—	6090	—	—	6090
ZM2AWH	1560	—	—	—	—	1560
ZM3US	—	—	7670	375	—	8045
ZL3QN	—	—	4655	—	—	4655
ZM4FX	550	—	7975	6100	3300	17855
ZM4DS	505	—	8780	5270	—	14555
ZL4NH	—	—	8425	—	—	8425
ZL4MY	625	—	2225	—	—	2850

C.w. Section

Call Sign	80	40	20	15	10	Total
ZM1HV	100	220	5775	5515	2345	13955
ZM1AMO	—	—	11265	—	—	11265
ZL1DV	—	—	10715	—	—	10715
ZL1MQ	55	165	5345	3425	1690	10690
ZM1AIZ	210	1700	3790	3080	1765	10545
ZM1GX	—	—	2580	1895	3930	8405
ZM1AMM	275	630	5415	2040	—	8360
ZM1IL	—	—	—	6185	2610	8195
ZM1AFW	[illegible]	160	2205	675	1225	6030
ZM1BDN	—	—	5585	—	—	5585
ZM1ARV	—	—	1335	—	—	1335
ZM1BHQ	1060	—	—	—	—	1060
ZL2BCO	—	3085	7565	2710	—	13330
ZL2AUP	—	—	2905	6145	—	10050
ZM2CD	—	—	—	—	5355	5355
ZM2AH	—	—	1495	1335	—	2830
ZM3AWH	[illegible]	—	—	—	—	850
ZM3US	—	—	3755	—	—	3755
ZM4CA	155	—	8735	—	—	8890
ZM4GA	—	—	6940	—	—	6940
ZM4BO	—	2065	—	—	—	2065
ZM4AT	—	—	4050	—	—	4050

OVERSEAS

Phone Section

Oceania

DU1FH	49657	YB1BM	700
KH6GMP	36530	W3CHH/KG6	662
KH6IJ	31400	FK8AH	660
KR6JX	18330		

Europe

CT1LN	231	OH8LU	8
DL6TV	10919	OK1AGO	728
DJ4LK	9664	ON5MG	3706
DL7AA	7130	OZ7KB	742
DL8PC	5920	OZ3PO	550
DJ4UF	1581	PA9OI	306
DM2AUF	1552	PA0DEC	234
DL9YC	156	PA0JML	78
EA3RF	1104	SM3CXS	4594
EA8GK	182	SM0CER	2940
EA8BN	168	SM7ANB	2156
EA2CW	32	SM0BYG	1428
F9RM	2550	SM6CWK	1210
G3PHO	1980	SM0MC	828
G6XN	1456	SM3BUS	650
HA6KNB	81	SM0OY	255
HA3MB	30	SM7ABL	238
HB9AHA	2365	SM3VE	195
HB9UD	1040	SP9ABE	1280
I1AA	5634	SP6RT	310
I1AMU	1500	SP5CKM	168
I1AT	1040	SP8HR	168
I1AJ	862	SP1AGE	68
LA9OI	780	SP1BHX	40
LA5QK	528	SP8BLF	24
LZ1KAA	144	SP1CTN	12
OH6RH	352	SP9KR	2
OH2FS	30		

Asia (excluding Japan)

EP2BQ	5438	OD5BA	24
EP3DX	50	ZC4MT	312
MP4BHL	4590		

Japan

JA0ADT	680	JA3AAW	3408
JA0HXH	442	JA3HTT	2165
JA0IAM	306	JA3BRB	1159
JA0EZP	30	JA3FD	1014
JA1OCA	6631	JA3HZT	936
JA1HVS	2912	JA3NDS	792
JA1AAT	2567	JA3ELU	405
JA1UOC	1846	JA3FL	340
JA1KRU	1620	JA4BJO	10008
JH1MTR	1484	JA4XW	5180
JH1MNF	1300	JA4FM	2556
JA1VJR	965	JA4BEX	2793
JH1BLX	968	JA4FHE	1632
JA1AS	420	JA4FVP	432
JH1DMR	320	JA4DDM	164
JH1GOZ	300	JA4DZ	96
JR1EEU	147	JA5IU	2976
JA1UQA	147	JA4AQR/5	1120
JH1ECW	90	JA5MG	506
JA1RZN	27	JA6AD	16000
JA1OYB	18	JA6BSM	1022
JA2IY	8015	JA6PY	220
JA2HNP	5082	JA6KDP	119
JA2NNF	1012	JA7MA	11955
JA2GTI	836	JA7KBR	1152
JA2PAA	912	JA7TJ	320
JA2DNA	650	JA8ARA	8874
JA2AGT	288	JA8EVL	670
JA2NOQ	280	JA8DTD	217
JA2WK	182	JA9AG	18404
JA2UJS	56	JA9YBA	17262

North and South America

W1OKG	2128	K8AQS	1378
K1VTM	1666	W9ITD	168
W2FCR	6602	W0GNX	10471
W2LEJ	1136	W0ZXO	1552
W3WNW	675	WA0EPG	36
W3TLN	10336	CE3AA	572
WA3HGV	317	HP1JC	2184
W3KE	176	HP1AC	120
K4MG	1391	KZ5NW	784
W4WSF	504	LU4ECO	460
W4WRY	228	OA8V	3672
K4OVE	66	PJ9JR	5912
WA5WMK	9975	PY3APH	975
WA5ALB	1200	PY4KL	330
WA5UCT	968	PY4AP	126
W5OB	770	PZ1AII	1660
W5RSZ	96	VE3EWY	8064
WA6EPQ	21500	VE3GCO	5996
K6SVL	10260	VE1TG	2464
K6HPZ	9801	VE3NV	1248
W6DGH	5962	VE5TO	255
VE7BNE/W6	2442	VE1AIH	132
WA6FIT	1530	XE1LLS	7050
WB6JOD	720	YV4IQ	6528
W8RQZ	120	YV1YC	4692
WA8QIY	2784		

Africa

CR7IC	4606	CR7IZ	1870

U.S.S.R.

UA0DG	2954	UK9OAW	2128
UA0LZ	536	UA9BE	9146
UW0IX	414	UA9MT	6
RA0LEH	550	UW9CR	112
UA1CS	2067	UK5IBM	2440
UA1FA	1110	UT5DF	160
UA1IG	1960	UK5EAQ	550
UW1LW	8	UB5SJ	1045
UK2FAC	396	UK5MAF	6324
UW3FD	4509	UK5IAZ	688
UA3HO	1668	UC2WE	1218
UK3ABO	618	UK2AAB	340
UK3YAB	138	UC2DN	24
UA3JD	332	UK6DAD	334
UV3FD	1890	UD6BD	168
UV3MM	70	UG6JJ	78
UW3AX	120	UH8BO	176
UW3EH	1760	UI8CD	280
UK3SAB	3048	UK8HAA	174
UW3IN	3297	UO5BZ	32
UW4NH	3139	UK2BBB	2546
UA4CZ	1534	UP2PA	1216
UA4PW	276	UP2ER	192
UW6LC	3444	UK2GAT	2
UA6PG	126	UK2RAA	216
UA6RB	59		

C.w. Section

Europe

DL6TV	5404	DM2AUF	1312
DL7AA	4205	DM4YEL	1300
DL9PT	2205	DL1GN	442
DJ4UF	1496	DM6WAO	224
DJ4KD	1482	DM2AWI	126

C.w. Section—Europe (continued)			
DM4EL	88	OK2QX	2056
DM2ATL	60	OK1ASJ	50
DM3BE	32	OK2BEU	32
F8TC	1972	OK2BPE	27
F9YZ	1020	ON4XG	1552
G5RP	2424	OZ1W	748
GM3CFS	1512	OZ4FF	250
G6XL	1332	OZ3PO	132
G2DC	828	OZ4HW	40
G3VW	396	PA0JR	432
LA1OA	91	PA0VB	216
LA6U	84	PA0BRA	108
LA8CE	70	SM7ANB	2750
LZ2DC	1368	SM3CXS	2488
LZ1KWF	48	SM0BYG	1660
LZ2RF	32	SM5EXE	1404
OH2FS	3276	SM3VE	750
OH6SE	2775	SM3BUS	304
OH3TY	1008	SP3DOI	1649
OH9RJ	600	SP8ARY	918
OH3MK	243	SP6TQ	126
OH7NW	140	SP5HR	108
OH2XM	40	SP5AFL	2
OH2LU	32	YU4EBL	1638
OK3RZ	6120	YU4BYZ	200
OK3BOB	3410	YU1SF	4

Japan			
JA0AJH	357	JA2WK	616
JA0DJE	360	JA2EIV	610
JA0AC	144	JA2EEY	96
JA0FFL	147	JA2RZF	8
JH1AWI	5316	JA3HTT	3425
JA1SR	4620	JA3AAW	1476
JA1JKG	3692	JA3SMA	288
JA1FGB	3198	JA3CS	126
JA1KRU	2535	JA4XW	7409
JA1AFF	2236	JA4BEX	4202
JH1LKH	2205	JA4DDM	33
JA1LRE	828	JA5MG	1365
JR1EFG	784	JA4AQR/5	620
JA1WVK	708	JA6DD	96
JH1MTR	670	JA7JI	3060
JA1IZZ	649	JA7FUJ	1700
JA1UOC	320	JA7MJ	1340
JA1NHM	320	JA1XYO/7	1100
JA1ACA	144	JA7TJ	112
JR1WC	126	JA7YFA	84
JH1GOZ	80	JA7AD	50
JA1AS	68	JA8GR	216
JH1ECW	50	JA8DTD	160
JA1UTC	32	JA8GBT	60
JA2HNP	2200	JA8GSX	12
JA2IYJ	1748	JA9YBA	10506
JA2DNA	1561	JA9BKU	1062
JA3CPD	1067	JA9ENB	368

North and South America			
WA0KDI	4698	W6RGG	15345
W0AIH	3768	K6QZ	10440
WA0EPG	370	K6EKR	7328
W4UDS/0	164	W6DGH	6452
W1EVT	13244	W6TZD	6150
W1FL	6068	K6AHV	3464
W1EZD	912	W6CLM	1120
W1SWX	40	W6KHS	720
W2MEL	10168	K5MHG/6	846
W2LWI	3304	W6ISQ	70
W2IVP	3192	W7IR	17830
W2HL	880	W9IHN	10086
WA2LDX	144	W9QWN	2000
W2DF	246	HP1AC	306
W3NU	15696	KZ5NW	530
W3AZD	3240	PY7SR	72
W3KE	234	VE3EWY	5356
W4WSF	3750	VE1TG	1782
K4OD	3003	VE3GCO	567
W5OB	4030	VE1AIH	441
W5RUB	1600		

Oceania			
FK8AH	552	W3CHH/KG6	319
KH6IJ	17802	KG6JAC	1008

World-Wide			
CR7IZ	918	ZS2A	660
VS6AF	1160	ZS6D	168

U.S.S.R.			
UA0FR	3069	UA1SW	168
UK0ZAD	2068	UA1XI	75
UA0JO	1764	UK2FAM	858
UW0IX	1653	UK3AAO	5394
UK0CAA	1008	UW3EH	1188
UA0ML	735	UA3DAK	1030
UA0ZS	610	UA3NP	612
UK0IAA	670	UK3YAB	505
UK0CAO	561	UK3TAA	249
UA0GU	538	UW3NE	[illegible]
UA0ZAO	512	UA3JD	84
UA0LJ	468	UA3YR	80
UK0ZAA	350	UV3EM	60
UA0ZZ	252	UA3ST	8
UA0ZAM	132	UK4WAB	680
UA0LAF	8	UK4WAC	40
UA1DZ	6500	UA4WAE	378
UA1ZW	2775	UW6LC	528
UK1AAA	1560	UW6PT	3682
UK1AAG	696	UK9HAD	2970
UK1ZAB	180	UW9WB	1748

U.S.S.R. (continued)			
UA9JL	[illegible]	UF6LA	330
UW9AI	839	UF6DM	331
UA9HM	567	UF6DA	32
UW9WL	364	UK6FAA	8
UK9OAW	288	UF6FAL	2
UW9AT	234	UG6JJ	138
UW0LR	770	UH8BO	144
UW0LT	585	UK8HAA	98
UW0LI	528	UK8AAA	140
UC2WG	32	UI8AI	30
UC2BP	21	UK8IAA	18
UK5JAA	3024	UI8AAF	2
UK5UAL	2806	UJ8AB	50
UK5MAA	2223	UL7BG	1440
UK5IAZ	1378	UK7GAA	1266
UB5QR	1360	UL7GW	986
UK5VAA	1188	UL7JG	742
UT5WW	504	UO5AP	574
UB5OE	288	UO5OS	410
UB5VY	270	UK2PAA	3380
UT5BW	4	UK2BBB	1897
RB5VAS	4	UP2OX	1168
UY5OO	324	UP2ZBV	260
UY5ZM	196	UP2AY	15
UY5XR	192	UQ2GW	980
UY5AO	120	UQ2CC	654
UY5AP	32	UR2GAT	330
UD6AM	772	UQ2AQ	50
UD6BW	455	UK2RAN	868

Overseas S.w.l. Section

BRS-26431	7412	UA2-12557	1396
BRS-31976	7136	UA3-1271	720
BRS-32525	2772	UA3-170-56	270
A3032	1800	UA3-127230	140
BRS-26870	1560	UA3-127217	48
BRS 27880	1216	UA3-12711	40
DM2703/A	2260	UC2-009109	1080
DM4722/M	1748	UC2-0091	196
DM-EA-4938/B	380	UA4-0957	1786
DM4574/G	168	UA4-09543	404
HE9HIU	3744	UA6-10160	130
I1-13396	2835	UA6-150-0503	612
I1-14073	2394	UB5-07325	1403
I1-12387	1034	UB5-073389	1302
JA0-1893/1	12460	UB5-0683	1010
JA0-1330/JA	7560	UB5-077092	846
JA0-1918	728	UD6-001-62	720
JA1-4876	11068	UF6-01278	40
JA1-10669	8448	UP2OE/SWL	3060
JA1-9621	2862	UQ2-037-63	1420
JH1-JFR	1996	UQ2-037-60	88
JA2RFH	1012	UA0-10316	384
JA4-2706	3958	UA1-14322	1428
JA4-1410	1290	UA2-16912	3424
JA6-1697	2392	UA2-12557	2400
JA7-2237	3048	UA3-12711	61
JA8-2106	1386	UA3-170-56	1534
JA8-1997	1036	UA3-151-16	814
JA8-31	1012	UA4-0957	1764
LA-M5605	368	UA4-09543	728
LZ-1A312	78	UA6-101-60	2274
NL-990	42	UA6-150-0502	510
ONL-383	3868	UA9-146-95	122
SM5-2736	1600	UB5-073389	4284
SP8-1079	3876	UB5-07325	2404
SP9-0668	2145	UB5-0683	408
SP1-8189	325	UD6-001-62	720
SP2-1157	216	UP2OE/SWL	898
SP1-1104	205	UQ2-037-63	1860
UA0LH (SWL)	3993	UQ2-037-60	780
UA0-10771	1890	WPE-2QKU	898
UA1-14322	2310	SM2-13169	11760
UA1-169125	396		

CHECK LOGS

AX3JI	K2DT	UA3DD	UO5AF
AX4RF	K6ALH	UA3DL	UO5AW
CE2CR	LA2B	UA3FF	UV9PI
DM2AYK	LA8OM	UA3GO	UW3HI
DM2BJD	OH6AA	UA4WK	UW3FW
DM2CHM	OH6NH	UA6BV	UW6AO
DM2CYO	OZ2EU	UA9GC	W3MDJ
DM2DQN	OZ3KE	UA9IQ	W4JUK
DM2EDL	OZ4PM	UA0FD	ZM2VH
DM3TF	OZ7XG	UA0GF	ZM2AFH
DM3WSO	OZ8BN	UA0LD	DM1960/N
DM4CF	RC2WAQ	UA0PJ	DM2542/L
F6ATE	SM2ALU	UA0YT	DM3133/G
HA0KHP	SM3BUS	UB5NS	DM4681/A
JA1NMW	SM7TV	UB5UU	DM4843/L
JA2WAA	SM7ACB	UK5QAU	DM5173/G
JA7AD	SM0BDS	UK6GAE	DM5177/F
JA0BH	SP2BMM	UK0NH	DM5302/G
JA0YJA	UA1CK	UL7TA	OZZX

AUSTRALIS BALLOON FLIGHTS—A PRELIMINARY REPORT

*By RICHARD TONKIN**

This article represents a preliminary report on the results of the recent flights of the Australis translator system on balloon packages. Because all of the tapes and other data from the flights has not yet been analysed, a complete list of the Amateurs who worked through the package, and further details on the results of the flights will be held over until the next issue of "A.R."

The main reasons for conducting the balloon flights with the Australis translator were to demonstrate its operation over relatively long distances and to experiment with antenna systems which could be used on any future flights. The translator used was a prototype of one of the four channels which, if all goes well, will fly on the A-O-B satellite next year. The translator was built by Les Jenkins, VK3ZBJ. Its input was 146.00 MHz. (Channel B, f.m.), with the output on 432.30 MHz. The power output was approximately 500 milliwatts. Prior to the balloon flights, the translator had been operated for several weeks on top of Mt. Dandenong, near Melbourne, and a considerable amount of interest was shown by Amateurs in this test.

Permission was obtained from the Department of Supply to fly the translator as a "piggyback" experiment on the March-April series of scientific research balloon flights from Mildura, about 350 miles north-west of Melbourne. The balloon series, called HIBAL, consisted, so far as the Australis translator package was concerned, of four flights, to 70,000 (70K), 90,000 (90K), 105,000 (105K) and 120,000 (120K) feet.

The balloons are several hundred feet high when launched and they gradually assume a spherical shape as they rise into the upper atmosphere. The payload, or gondola, consists of a tubular steel frame inside which the equipment is located. The gondola is about the size of a small car, and weighs an average of about 500 lbs.—so HIBAL is no mean balloon!

After launch from Mildura airport, the helium-filled balloon rises at a rate of about 1,000 feet per minute until it reaches its float altitude. The length of time that the balloon and its payload float depends on the type of experiment being flown, but two to three hours was the average float time for the four flights on which the Australis package was hitching a ride. At the end of the float period, a radio command transmitted to the gondola from the HIBAL control station at Mildura airport separates the balloon from the gondola. As the gondola drops into the denser layers of the atmosphere, a parachute opens and lowers the payload to the ground. A chase aircraft follows the gondola's descent and radios its landing position to HIBAL Land-Rovers which travel to the landing site and recover the payload

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George Long, VK3YDB, who prepared the translator for the flights, and I travelled to Mildura before the first flight to test the translator with the HIBAL packages, settle the final flight details with the HIBAL personnel and meet the Amateurs at Mildura who had previously offered their help with the flights. The Amateurs who assisted the project at Mildura included Mike VK-3CCX, who was a real tower of strength and who, being a member of the HIBAL crew, was able to give invaluable technical assistance on the four flights; Noel VK3AGF, who did a fine job in communicating with the anxious project members in Melbourne; Graham VK-3YEJ, Joan VK3YEK and her OM, Ray VK3ZBN. Without the seemingly tireless help of these people, it would not have been possible to fly the Australis translator on the HIBAL flights.

The four flights were launched at about dawn on 23rd March (70K), 25th March (105K), 2nd April (90K) and 5th April (120K). All flights rose to their planned altitudes and the translator worked well on the four trips it took into the stratosphere. The same translator unit was used on each flight and it was recovered undamaged after each flight. Before the flights began, it had been calculated that the Mildura launch site and the planned float altitudes would allow Amateurs in Adelaide and Melbourne (and points in between) to maintain contact during the ascent and float phases of the flights. We were a little more optimistic about the 120K flight and we hoped, because of the greater altitude it would reach, that we may be able to get signals into it from further afield than Melbourne.

In the event, Adelaide-Melbourne (and vice versa) QSOs were achieved on all four flights. The copy varied from unreadable to numerous dBs over S9, depending on the power that the transmitting station was putting into the translator, how many people were trying to get into it at the same time, and the orientation of the antenna system on the gondola. The 2 metre receive aerial was a vertical ground plane and the 432 MHz. transmitting antenna was an omni-directional turnstile. For the 70K and 120K flights, the antenna system was mounted on the top of the HIBAL gondola and on the 105K and 90K flights it was located on the bottom of the gondola. These were the two most convenient positions to put the antennas, having regard to the need to keep the Australis aerials away from the HIBAL equipment and taking into account the shadowing effect which the gondola frame and the HIBAL experiments had on the Australis antenna radiation patterns.

The results from the four flights was very interesting and it appears, from initial data that have been looked at, as though the top-located antennas (70K and 120K flights) operated better than the bottom-mounted ones (105K and 90K flights), at least so far as Melbourne Amateurs were concerned. It is possible that atmospheric temperature inversions played a part in some of the long signal fades which occurred during the flights. It is hoped that a more complete report on these aspects of the flights can be included in a later issue of "A.R."

The following is a preliminary list of Amateurs who worked through one or more of the translator flights. As mentioned above, this is not a complete list and represents only the call signs heard on some of the tapes of the flights. The complete list and more details of each flight will be in July "A.R."

VKs 5ZDR, 5NZ, 5QZ, 5ZK.

VKs 3ZCE, 3YFI, 3FW, 3YBO, 3ZBJ, 3YDB, 3AGF, 3YEJ, 3ASV, 3AKC.

VKs 1VP and 2ZHM.

There are probably at least another six VK5 calls who worked through the translator and a couple of other VK3 ones as well. It would be a great help if the people who worked through it would drop me a line and give me the date, power output used, antenna used, stations heard, etc. As is usual with projects of this kind, we tend to be enthusiastic about it while the action is there, but a little remiss when it comes to looking back through the log book and putting pen to paper. An appeal on the VK3 and VK5 Divisional broadcasts yielded only one written report, so please sharpen up the pencils and send in your report, plus any comments, good or bad, that you have about the flights. After all, the Amateurs of Australia, through the Institute, are paying for the Australis project and they should be making the best use of the balloon flights and of the satellite to follow.

It was particularly pleasing, on the 120K flight, to hear Eddie VK1VP in Canberra and John VK2ZHM at Cootamundra, coming through the translator. The sort of distances covered in that flight give some idea of the coverage which will be possible with the A-O-B satellite, when VK-JA contacts should become commonplace on v.h.f.

The co-operation given to the Australis balloon project by Mr. John Hillier and his team at the balloon launching station at Mildura deserves special mention. The Australis translator was flown on a space, weight and power-available basis. While it was originally planned that there would be only one translator flight in the March-April series of balloon launchings, George VK3YDB, by going to Mildura and talking with the HIBAL people, was able to arrange that the package flew on four, rather than one, flight. The active assistance given by John Hillier and his team in arranging the flights is greatly appreciated by the W.I.A.-Australis group.

(Continued on Page 27)

KEY SECTION

During the 1930s an active element of Institute affairs was a group known as the Key Section. It appears to have dropped into limbo (with so many other things) in the early 40s, and did not re-appear after the war.

The 1971 Federal Convention in Brisbane agreed to revive the Key Section, and the rules for its operation which were accepted were these:—

1. That the Key Section be open to all members who have worked at least 50 different stations by two-way radio contact using A1 or A2 mode. To qualify as a contact significant text should be exchanged, say, 30 words apart from RST, operations during contests are excluded.

2. That the Federal President's Cup, awarded to the Key Section of the W.I.A. in 1930, be revived and mounted and awarded annually with inscription to the member of the section who claims the greatest number of contacts using A1 or A2 mode in that year. No member may hold the cup for more than two successive years.

3. That the W.I.A. make available to overseas Amateurs a certificate or other token for working 20 or more members of the Key Section of the W.I.A.

4. That the W.I.A., through its Key Section, make available certificates of proficiency to members of the Section for successfully receiving and sending using A1 or A2 mode at speeds of 15, 20, 25 and 30 plus words per minute.

5. That the Federal Contest Manager be approached to alter the rules of W.I.A. contests to remove the bias against the use of A1 in contests (because of the lower scoring rates which can be achieved using this mode under contest conditions in Australia), such as by offering a multiplying factor for all contacts using A1 or A2 mode.

6. That every method be used to introduce more A1 or A2 to the v.h.f. bands even to the extent of making operation of v.h.f. part of the requirement for some of the awards associated with the Key Section.

7. That the Key Section be managed by a group consisting of an officer appointed by the Federal Executive and a nominee of each Divisional Council.

8. The nominee of Federal Executive will act as nominal head of the group and report the activities of the Key Section to the Federal Council.

9. The Divisional nominees will be appointed by Divisional Councils and will be known as Divisional Co-ordinators. Appointment will normally be for a period of three years.

10. In the event of a Divisional Co-ordinator resigning, or being replaced as nominee by the Divisional Council, a new nominee will be appointed by the Divisional Council, the tenure dating from the time of the new appointment.

11. The Divisional Co-ordinator may call upon the services of not more than three other persons, whose appointment must be ratified by the Divisional Council, to assist him.

The Federal Executive have appointed Deane Blackman, VK3TX, as Key Section Manager. The appointment of Divisional Co-ordinators, which is the next task in setting up the Section, is in hand.

ANNOUNCING A SPECIAL CALL AND PREFIX

KC0KC will be heard on all bands for the period 1st July, 1971, through to 5th July, 1971. Members of the Mobile Amateur Radio Awards Club Inc. (M.A.R.A.C.) and the Independent County Hunters' Nets meeting in Kansas City through those dates will man the station around the clock.

KC0KC will be on 10, 15 and 20 metres, beginning when the band opens in Kansas City around 1300 GMT until the band closes late in the evening. Activity on 40 and 80 metres will probably begin around 2200 hours GMT until 1300 GMT the following day. However, activity will generally be on any band at any time that band is open.

Activity is planned around the following frequencies:—

	CW	Phone(1)	Phone 2
80 Metres	3550	3880	3910
40 ,,	7050	7205	7260
20 ,,	14050	14205	14285
15 ,,	21050	21280	21360
10 ,,	28050	28600	

Notes: (1) Several times each hour operator will announce and listen 5 or 10 KHz. below the bottom of the U.S. phone band for DX stations.
(2) If "pile-ups" develop, operator may listen off his transmitting frequency.

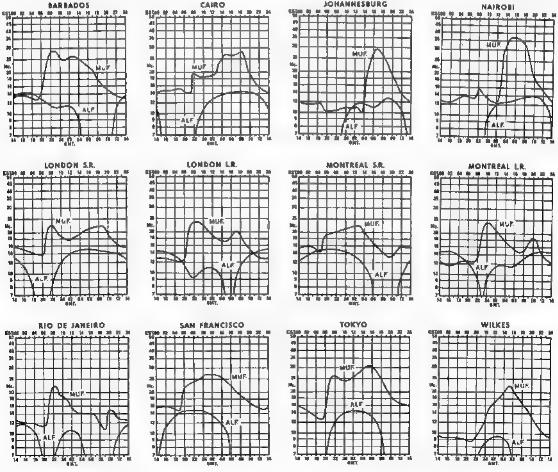
Log all contacts in GMT

For special QSL send SASE or two IRCs to (or via W0 QSL Bureau):—

KC0KC or WA0WOB QSL Manager
P.O. Box 763,
Shawnee Mission, Kansas,
66201, U.S.A.

PREDICTION CHARTS FOR JUNE 1971

(Prediction Charts by courtesy of Ionospheric Prediction Service)



May I Talk to You About the 35th Federal Convention in Brisbane

In last month's "A.R." the "Wind of Change" was mentioned as if it had been something sudden. It is and yet it isn't. Zephyr breezes have blown for some little while. They have now increased to the point where their influence is doing much to improve the exchange of information in an efficient way at a meeting such as the Convention. Every Divisional Councillor and the many observers at the Convention all commented on this. Your Federal President is largely responsible for this. His overseas trips helped, of course, enormously. The main objective for all of us is communication — effective communication. If this can be achieved more positively with less formality, so much the better. The pendulum could swing too far the other way. This is recognised. But we are dealing with persons, not faceless monsters or remote bodies out of reach and out of touch.

Which brings me back to people. Recognition of problems and genuine attempts to resolve them. This is what the Convention is all about. This is what the Delegates dealt with. Your problems, your troubles. I.T.U and I.A.R.U seem remote. Not your problems you might say. How wrong could you be? You want W.I.A. to be there to help you in so many ways. In the beginning to help you to learn the fundamentals of electronics, to absorb and use the Morse Code, and to put you in touch with cheap gear and components. Later on the emphasis shifts as you yourself develop expanding interests. You are hedged about by Regulations, far too many of them you may say. In 1910 the W.I.A. began. Not only for social contact. Not only to present a united front. But also the sharing of benefits which only a larger group can command. No, I will not enlarge on this here except to say that the W.I.A. interest in I.A.R.U. is not misplaced. Without the united front—world wide—we would definitely not possess the bands we have today. Pressures by commerce, by governmental agencies and by many other services would have seen to that.

So, at the Convention, I.A.R.U. and I.T.U. matters received much attention because Michael Owen, VK3KI, and Peter Williams, VK3IZ, had returned a few days beforehand from the I.A.R.U Region III Association Conference in Tokyo and the I.T.U Space Conference is scheduled for July in Geneva. Yes, plans had been laid. Keep your fingers crossed; we might keep what we have. We could even hope to gain a little ground. For I.A.R.U. affairs, David Rankin, VK3QV, was appointed to be our Liaison Officer.

Equally, at this Convention, the financial side of W.I.A's affairs got a very good airing. The theme was how to do more at less cost. Facts of life have to be faced however. There was absolutely no question of how to squeeze more money out of members. In fact the contrary applied. Can we do anything more for members within our budget and, if so, what and how? As a newcomer to the Australian scene I was impressed by the massive amount of thought devoted to financial matters. I assure you it was not put on for my benefit. I am too old a hand to be hoodwinked into a belief that this was mere window-dressing.

The proposed computerisation (horrible word!) programme took two full pages of my notes. It stands to reason that, if the thing is done properly, savings can accrue. The most fantastic depth of detail unfolded before Delegates' eyes. Even down to such minutiae as how to preserve the confidential nature of information to be sought from members. How to get essential data and the practical steps required to process it were all covered as well as the relative importance of the end result. The computer can churn out, in seconds, any collection of detail which may be required. Not only prints-out of names, call signs and addresses for the call book, for magazine wrappers and umpteen other needs—transient and permanent—subscriptions and their apportionment, but, furthermore, bulk statistics of one kind or another which Federal Executive must have in their endeavours to convince disbelieving authorities of the correctness of their submissions. So, if you have to send your subscription to Melbourne next year or, if you are asked for any details you think may be impertinent, don't worry. The whole thing is under the most rigid Divisional control. The Federal boys will not run away with the loot or misuse it.

Various technical affairs also took up a lot of time. Interference against us and by us and how best to achieve satisfactory results. After all, we pay fees equivalent to others but receive different treatment. The U.S.A. phone operators petitioning F.C.C. for a further 50 KHz. downward of band allocations and how we can most effectively display our opposition.

Project Australis and the dearth of details for you received much comment on how to put this right. The back-room group are doing a splendid job all right, but for goodness sake tell us. Our money is involved apart from anything else. So, a plan was devised and John Baltrick, VK3OR, is the corner-stone. Now the V.h.f. Groups in Divisions will have a chance to play with the flight-tested package. Dr. Deane Blackman's proposed Key Section got off the ground. Traffic nets regularisation (s.s.b. vox), operators' identification "at the beginning and end" of transmissions—what is a "transmission", how long, break-in—7050 KHz. was designated as a calling frequency as, for example, calling for aid on safari or using it for sked-making and then QSYing elsewhere—people could leave their receivers running on this frequency—and so on. Space does not allow me to go into detail I fear.

"So You Want to Become an Amateur" booklet is now in print and a very good one it is too. The only error detected so far is the fee payable when applying to sit for the exam., should, of course, be £2.00 but there are rumblings about raising it. The new Call Book should be out by the time you read this. Much criticism about the delay which, incidentally, was not our fault. How to deal with "A.R." and Divisional Bulletins—how can we economise without lowering standards?

Is that all? Do not be deluded. The discussions on the "Novice" licensing report (received only a week beforehand by the way) from Mr. Rex Black's (VK2YA) Committee got through seven pages of my notes. What do you mean by "Novice" licensing? Like the JAs on 15 metres? No, but definitely no. The report was too good to set it on one side but much more thought and discussion is required before we can go further. Divisions have it. Why not ask about it? As one Delegate aptly remarked, "It's a large thing with few knobs to hold on to." General organisation and the efficient administration of W.I.A affairs received attention in the light of the impending change-over to the new Federal Constitution after the W.I.A. Company Memorandum and Articles of Association have been signed, sealed and delivered. All this was, of course, tied in with the financial arrangements, "A.R." policy, and the role of the new Secretary-Manager.

Those who were in the 20 years of age group in 1910 would now be in their eighties. With the years, most of the pioneers will be passing on. The Convention again devoted time to ways and means to accumulate and preserve items of historical interest. The onus has been placed on Divisions to examine this aspect, possibly seeking the aid of local libraries and museums. Let us gather together everything we can before it is too late.

Another item was the change-over of the Federal Contest Committee from VK6 to VK4. What a magnificent job they did on this over the past six years and we look forward to another good period, especially as we believe Peter Brown, VK4PJ, is mixed up with it. Symptomatic of the times, by the way, were the very reduced numbers of agenda items about contests and awards rules. A good thing this, so please don't brew up a load of new alterations! Let the people in VK4 get the hang of the thing. Geoff Wilson, VK3AMK, naturally got a commendation on Federal Awards, especially for his excellent handling of the Cook Bi-Centenary Award. Ken Pincot, VK3AFJ, of "A.R." fame, received Life Membership and had his badge bestowed upon him at a moving little ceremony, and Alf Chandler, VK3LC, was commended on his work of running the Publications Department which will henceforth land up on my table.

I know I have had to leave out a lot, e.g. repeaters and beacons, badges, publications, policies, submissions about multiple-choice examination papers and operating procedures, etc. Don Watson, from Townsville, will vouch for this. He sat in as an "observer" for the VK5 Delegate. This was another new departure. The local Division provided "observers" for the far-away Delegates and this innovation was much appreciated not only by the Delegates but also by the "observers" themselves. The point is well taken, with innovations and modernisation, that we must keep the best of what we have however.

The venue of the next Convention is to be Melbourne for several valid reasons.

I started off this article about the I.T.U. and I'll end about it also. Tom Clarkson, ZL2AZ, will be attending the big July Conference in Geneva as an observer on our behalf. As somebody said, it would be difficult to find a better qualified person anywhere in Region III, which encompasses the whole area roughly from India to the mid-Pacific. The Delegates to this Conference are officials of governments. Amateur Radio is only a small part of the whole and must be content with observers. We've done our part with our government. Have you done your part with your Division?

73, VK3CIF.

Photograph of Federal Executive Delegates at the Brisbane Convention of the W.I.A., held over Easter. Right to left: David H. Rankin, VK3QV, Peter D. Williams, VK3IZ, Michael Owen, VK3KI (President); Peter B. Dodd, VK3CIF (Sec.-Man.), Ken E. Pincott, VK3AFJ (Editor "A.R.").

I.A.R.U. REGION 3 ASSOCIATION CONFERENCE, TOYKO, 1971

BACKGROUND TO CONFERENCE

At the Conference of Sydney 1968 at which the Region III. Association was formed, it was decided to have a Conference in 1971 and notice was given by J.A.R.L. that an invitation would be extended to have it in Toyko. This was confirmed and preliminary details completed in January 1971.

In collaboration with the Secretariat, J.A.R.L. made arrangements for the Conference to be held at the Fairmont Hotel and the Zenkyoren Building, Toyko. The meetings commenced with a preliminary informal one on 16th March with formal sessions on 17th, 18th and 19th March, and a concluding one on 21st March.

LIST OF PARTICIPANTS

I.A.R.U. W0DX, Mr. R. W. Denniston.
Australia: VK3KI, Mr. M. Owen; VK3VX, Mr. A. G. Pither.
New Zealand ZL4PG, Mr. D. A. Lloyd, ZL2AZ, Mr. T. R. Clarkson.
Philippines. DU1EA, Mr. E. M. Aristores; DU1MBN, Mr. M. B. Nolasco; DU1BEN, Mr B. P. C. Esquerra; DU1HR, Mr. H. del Rosario; DU1SA, Mr. S. A. Alson, DU9EO/1, Mr. E. O. Orbe.
India: VU2US, Mr. K. Umrao Singh.
Hong Kong: VS6AI, Mr. G. Flenner; VS6DR, Mr. P. Wight.
Japan: JA1AN, Mr. S. Hara; JA1BK, Mr. K. Mizoguchi; JA1NET, Mr. S. Morimoto; JA0IA, Mr. K. Kuwazawa.
Secretary: VK5IZ, Mr. P. D. Williams.

ARRANGEMENTS FOR MEETINGS

After the first meeting was opened by the Secretary-General, the head of the J.A.R.L. delegation (Mr. S. Hara, JA1AN, President of J.A.R.L.) was unanimously elected to be Honorary Chairman of the Conference. After welcoming the Delegates to Tokyo, he invited nominations for the officers of the Conference. Mr. R. W. Denniston, W0DX, was elected Chairman, and Mr. P. D. Williams, VK5IZ, Secretary. The J.A.R.L. described the arrangements that had been made to assist the Secretary in the practical work involved.

THE MEMBER SOCIETIES

Credentials were submitted by the Societies qualified according to the Interim Constitution, and it was agreed that, in addition to existing membership, the societies of India, Ceylon, Hong Kong would be members and that the American Radio Relay League would be a member, in view of the members it has in Region III.

STATUS OF CONFERENCE

In order to clear up some imperfections in the Interim Constitution, the degree of authority of the Conference was discussed, and, it being decided that it was competent to do so, several amendments were made in the Interim Constitution, their purpose to affirm that membership in I.A.R.U. is a prerequisite to membership in the Region III. Association. As a result, P.A.R.A. became the member Society to represent the Philippines. So the member societies represented and eligible to vote at the meeting were W.I.A., A.R.R.L., N.Z.A.R.T., P.A.R.A., A.R.S.I., J.A.R.L., H.A.R.T.S.

The agenda prepared at the preliminary meeting was approved. Reference is now made to the topics discussed and conclusions reached.

THE CONSTITUTION

After receiving from the Secretary-General on the activities of the last three years, and the financial position, and approving the final statement from the Sydney 1968 meeting, consideration was given to matters concerning the organisation of the Association and these revolved around the preparation of a Constitution to meet all foreseen requirements. After prolonged study the principles to be incorporated in a Constitution were agreed. Details are in the Minutes of the new Constitution, salient points being—

1. Conferences held at intervals of three to four years will control the Association. Between Conferences matters requiring the decision by member Societies will be dealt with by post.
2. Each Society will designate a Liaison Officer to be its representative in Association affairs.
3. The inviting Society will be expected to facilitate the efficient and economical running of the Conference, but not to bear the "out-of-pocket" expense that may be entailed. The cost of travel and accommodation for Delegates will be the responsibility of their Society.
4. The management of the Association will be done by four Directors and a Secretary, who will be appointed by the Conference on a personal basis and be responsible to it. Expenses incurred for the Directors and Secretary to carry out their duties will be the responsibility of the Association. This includes attendance at Conferences, at which Directors will participate, but not on behalf of a member society. Directors and Secretary will be appointed to act until the conclusion of the following Conference.
5. Rules of Procedure for Conferences are to be observed and they form Regulations attached to the Constitution.
6. Subscriptions are to be paid by member Societies, the amount being based on the number of members—the maximum being 15 cents (U.S.) per member with lower figures where there is a very large membership. The minimum subscription to be $25 per annum.

CURRENT SUBJECTS STUDIED

The I.T.U. World Space Conference.—The present situation regarding the approach to the Space Conference was described by W0DX, who as President of I.A.R.U., will be the official observer for the Union at the I.T.U. Space Conference. The status of negotiations with their Administrations was outlined by all the representatives of member Societies present. All information led to appreciation of the great importance to Amateur Radio of strong representation at Geneva.

W0DX described how he was enlisting the aid of all resources available in his task and how Region I. and Region II. would be represented in his team. He pointed out the high desirability of Region III. being represented to make his team a truly representative one of world Amateur Radio.

After prolonged study, the Conference decided on the principle that the Association should send a representative and considered the practicability of meeting the high costs involved. It was apparent that some extraordinary means of finding the funds would be needed and, as these were considered to be justified, it was decided to seek credit for the amount needed and to plan its repayment over several years.

Assuming the success of these arrangements for a representative, the person to be nominated by the leader of the team, W0DX, and to be approved by the Directors. This was done at a Directors' meeting on 19th March and ZL2AZ, Mr. T. R. Clarkson, was appointed.

The 7 MHz. Band.—The need for more spectrum space for the Amateur Service on an exclusive basis was emphasised. This is being pursued. As a general world administrative frequency conference seems to be in the very distant future, the best approach is a "piece meal" one and each Society was urged to try and get agreement by its Administration with a view to getting first national, then regional, and eventually world-wide expansion of the exclusive segment.

A survey of interference on the 7 MHz. band was presented by J.A.R.L. with the result of recent automatic recordings. After discussion of possible methods of meeting the situation, the Conference resolved that all Societies would actively pursue the subject of improving the 7 MHz. band situation.

Development and Encouragement of Amateur Radio Activity in Region III.—Among proposals to encourage activity in the Region a new type of award was suggested. This would recognise the merit of conducting recurrent QSOs in contrast to the brief single ones. This is being studied by several interested Societies.

Publicity and Public Relations.—Societies were urged to try and get Amateur Radio activities brought under notice of the public at large, by seeking publicity in the news media. News items such as the holding of the current Conference can be used to introduce influential reports of Amateurs and their activities. Societies should make known to others their success in this field.

Election of Directors.—The following were elected to be Directors: JA1BK, VK3KI, ZL2AZ, and W0DX.

Election of Secretary: VK5IZ.

Next Conference.—Hong Kong under auspices of H.A.R.T.S.

Invitations were extended by three Societies who offered to have the next Conference, namely, P.A.R.A., H.A.R.T.S. and A.R.S.I. After full consideration it was decided to accept the invitation of H.A.R.T.S. for it to be held in Hong Kong.

A Final Point.—As indicated in the provisions of the Constitution it is recognised that all expenses for Delegates to attend Conferences should be borne by their Societies. This decision highlights the special indebtedness of all concerned, first to W.I.A. and now to J.A.R.L. for meeting Delegates' accommodation expenses, which action has assured the success of the two Conferences—a most significant factor in the important formative stage of the I.A.R.U. Region III. Association.

NEW NEW

YOUR I.A.R.U. REGION III. OFFICER IS DAVID RANKIN, VK3QV

NEW NEW

VK2 MID-WINTER V.H.F.-U.H.F. CONTEST

INVITATION

The Contest Committee of the VK2 V.h.f./T.v. Group invites all Amateurs and S.w.l's with v.h.f. and/or u.h.f. equipment to participate in the 1971 Mid-Winter Contest. This will be held during the Queen's Birthday week-end in June. Awards will be made as stated in Rule 5 and scores from all accepted entries count towards the Annual Chairman's Trophy for VK2 Division.

Object: Amateurs in VK2 and VK1, at home or mobile or portable at field locations will try to contact as many other Amateurs as possible and over as great a distance as possible. They will do this on any one or more of the Australian Amateur bands from 52 MHz. and above.

Date/Duration: Contest starts Sat. 12th June, 1971, 1400 hours E.A.S.T., and finishes Monday, 14th June, 1971, 1200 hours, with rest periods.

The operating times are:—

Saturday 12/6/71—1400 to 2200 hrs. (8 hrs.)
Sunday 13/6/71—0800 to 1100 hrs. (3 hrs.)
—1200 to 2200 hrs. (10 hrs.)
Monday 14/6/71—0800 to 1200 hrs. (4 hrs.)

The Sunday 1100 to 1200 hrs. rest period is for the VK2AWI broadcast.

RULES

1. There are two time divisions for which entries may be submitted: **Division "T"** for the total, or overall contest duration, and **Division "S"** for the best scoring six consecutive contest hours which may, if desired, be broken by one of the rest periods, e.g. from 1900 Saturday night to closing at 2200, then from 0800 on Sunday morning to 1100, is accepted as six consecutive contest hours.

2. Entries may be submitted for either Division "T" (total) or Division "S" (six hours), or both of these, but the winner of Division "T" will not be eligible to also win Division "S".

3. **The various classes** in which participants may enter are:—
Class H—Home Station.
Class M—Mobile Station.
Class P—Portable (field) Station.
Class SWL—Listener, home station.

A station may enter in more than one class if satisfying the conditions: e.g. he could work from home, then go mobile and then portable.

4. Combining the divisions and the classes gives the following different sections available to contestants:—
Section HT—Home, total.
Section HS—Home, six hours.
Section MS—Mobile, six hours.
Section PT—Portable, total.
Section PS—Portable, six hours.
Section SWL—Listener, home, total.

5. Awards will be made to the winners of above sections for each of the following bands: 52, 144, 420/576, 1215 MHz. and above. Entry forms should clearly be marked in the block provided showing bands used in each section. A special prize will be awarded to the outright highest scorer in the whole contest in addition to any other awards the same entrant may win. As well as the awards mentioned, a **merit award** will be made for the best entry submitted by an operator who has held a call sign for 12 months or less.

6. **A Portable Station** is defined as being one at a field location not using normal car antenna and at least one mile from the home QTH of any operator of that station. Use of a.c. mains is permitted, but the station must not be at the shack of another Amateur.

7. **A Mobile Station** is defined as one whose equipment, power source and antennas are wholly mounted in or on the vehicle, which is capable of being driven with the equipment operating. The vehicle need not be moving and it may be at any location. Maritime and airborne mobile score the same as normal mobiles.

8. **Cross-band operation** is permitted as is the arranging, during contest hours only, of contest contacts. For this contest, h.f. bands are not permitted for the arrangement of contest contacts.

9. **Net frequency contacts** score as part of the band containing them and not on an individual net basis, i.e. 6 mx nets score as part of the 6 mx band score, and 2 mx nets as part of 2 mx.

10. **Contacts via repeaters or translators can NOT score in this contest.**

11. One scoring contact per station is allowed in every one "clock hour" for each band a station can work. One contact per clock hour means one QSO between, say, 1300 and 1400 hours. It is not necessary to wait a full hour to have a second scoring QSO with the same station on the same band, e.g. "A" works "B" at 1259 hours, they may then work again any time from 1300 to 1359 hours, and their following QSO is between 1400 and 1459 hrs. etc.

12. If two stations have a scoring contact on one band then, in the same clock hour have a contact on another band, both these contacts are allowed to score. If only one station can go to the other band and they have a cross-band contact, this is allowed to score but where both stations can go to the other band, cross-band contacts do NOT score. A pair of stations may therefore have several scoring contacts in each clock hour if they use enough bands.

13. In Section SWL, all scoring contacts heard can be logged, the hour rule not applying in this case.

14. **Serial Numbers** must be exchanged as usual before points may be claimed for a contact. The five or six digit serial number to be the R/S report (R/S/T for telegraphy), followed by three digits starting as shown below and increasing by one for each successive contact:—

For all 6 metre QSOs ... ... start at 601
For all 2 metre QSOs ... ... start at 201
For all 420 MHz. QSOs ... ... start at 401
For all other (incl. t.v.) ... start at 001

Note that the numbers for Net QSOs are to be in the same sequence of numbers as for the whole band.

15. From a.t.v. stations the same serial number is to be sent over the video transmission as is sent over the audio transmission.

16. **Logs** are not required, but may be sent in with the entry. If requested, they should be made available to the Contest Committee. Entries are to be set out on the entry form (or a close copy). This enables results and statistics to be extracted quickly. For cross-band contact, enter QSOs under band transmitted.

17. **Entries** should be sent to reach the Secretary, V.h.f./T.v. Group, Wireless Institute Centre, 14 Atchison St., Crows Nest, N.S.W., 2065, by Friday night, 16th July, 1971.

18. **Incentive Rating and Multiplier.**—The various bands and operating possibilities have been broken up into categories for the application of an Incentive Rating, from which an operator can derive the multiplier for each contest QSO. To obtain the multiplier for a contact, take the Rating for your station (from the Rating Table, herewith), **add** it to the rating for the station you have worked and this sum is called the Multiplier. The same Multiplier therefore applies to both stations in any one contact.

19. **The Distance Points** are based on the airline separation of the two stations in contact and amount to one point per ten miles or part thereof, on any frequency. The minimum distance for scoring is one mile, e.g. 1 to 10 miles equals 1 point, 50 miles equals 5 points; 51 miles equals 6 points, etc.

20. **The Score Calculation** for each contact is done by multiplying the distance points by the multiplier, derived as in Rule 18, e.g. a 6 mx net home station (rating equals 1 from table) has a cross-band contact over a 50 mile path with a 432 a.t.v. portable station (rating 10 x 2 equals 20). The multiplier for each of these stations is then the sum of their ratings: 1 plus 20 equals 21. Applying this multiplier of 21 to the distance points gives: 5 x 21 equals 105 score for the QSO, earned by each of these stations. The total score for a division is the total of all the individual contact scores in it.

21. In **Section SWL** the distance points are based on the airline distance from the station heard to the listener's location and the multiplier is the straight-out rating of the station, from the table.

22. From a.t.v. stations the audio channel may be on any band 144 MHz. or higher, the rating being based only on the band used for the video channel.

23. Only **one** call sign may be used from any one station.

24. Each participant must operate within the terms of his/her licence, abide by the rules of the contest, and sign the declaration at the foot of the entry form.

Entry forms are available from VK2 Division.

—C. G. Palmer, VK2ZGX, Chairman, Contest Committee, VK2 V.h.f./T.v. Group.

—Eric VK5LP, Vh.f. Sub-Editor.

TABLE OF INCENTIVE RATINGS AND MULTIPLIERS

Rating for Amateur TV (black and white) is video band rating x 2.

CATEGORY	RATING	6 and 2 mx Nets: H/P/M.	52 and 144 MHz. Tune: Home.	52 and 144 MHz. Tune: P/M.	70 cm. (438) Net. Home.	70 cm. (438) Net: Port./Mob.	420 and 576 MHz.: Home.	420 and 576 MHz., Port./Mob.	1215 MHz.: Home.	1215 MHz.: Portable/Mobile.	2.3 to 10 GHz.: Home.	2.3 to 10 GHz.: Port./Mobile.	21 GHz.: Home.	21 GHz.: Portable/Mobile.
6 and 2 mx Nets Home/Port./Mobile	1	2	4	5	4	5	10	11	16	17	20	21	23	24
52 and 144 MHz. Tunable Home	3	4	6	7	6	7	12	13	18	19	22	23	25	26
52 and 144 MHz. Tunable. Port./Mob.	4	5	7	8	7	8	13	14	19	20	23	24	26	27
70 cm (438) Nets Home	3	4	6	7	6	7	12	13	18	19	22	23	25	26
70 cm. (438) Nets: Portable/Mobile	4	5	7	8	7	8	13	14	19	20	23	24	26	27
420 and 576 MHz. Home	9	10	12	13	12	13	18	19	24	25	28	29	31	32
420 and 576 MHz. Portable/Mobile	10	11	13	14	13	14	19	20	25	26	29	30	32	33
1215 MHz.: Home	15	16	18	19	18	19	24	25	30	31	34	35	37	38
1215 MHz.: Portable/Mobile	16	17	19	20	19	20	25	26	31	32	35	36	38	39
2.3 to 10 GHz. Home	19	20	22	23	22	23	28	29	34	35	38	39	41	42
2.3 to 10 GHz Portable/Mobile	20	21	23	24	23	24	29	30	35	36	39	40	42	43
21 GHz.. Home	22	23	25	26	25	26	31	32	37	38	41	42	44	45
21 GHz Portable/Mobile	23	24	26	27	26	27	32	33	38	39	42	43	45	46

To find the Multiplier for a contact, ADD the Ratings of the two stations, OR. In the above chart, select the horizontal row corresponding to the category of one of the stations. Then select the vertical column for the category of the other station. The Multiplier for that pair of stations is the number shown at the intersection of these two lines.

VHF

Sub-Editor ERIC JAMIESON, VK5LP
Forreston, South Australia, 5233.
Closing date for copy 30th of month.
All Times in E.S.T.

AMATEUR BAND BEACONS

VK0	53.944	VK0GR, Antarctica.
VK3	144.700	VK3VE, Vermont.
VK4	144.380	VK4VV, 107m. w. of Brisbane.
VK5	53.000	VK5VF, Mt. Lofty.
	144.800	VK5VF, Mt. Lofty.
VK6	52.006	VK6VF, Tuart Hill.
	52.900	VK6TS, Carnarvon.
	144.500	VK6VE, Mt. Barker
	145.010	VK6VF, Tuart Hill.
	435.000	VK6VF (on by arrangement).
VK7	144.900	VK7VF, Devonport.
VK9	144.000	VK9XI, Christmas Island.
ZL2	145.200	ZL2VHF, Wellington.
ZL3	145.000	ZL3VHF, Christchurch.
JA	51.995	JA1IGY, Japan.
W	50.091	WB6KAP, U.S.A.
HL	50.100	HL9WI, South Korea.
ZK	50.100	ZK1AA, Cook Island.
KH6	50.101	KH6EQI, Hawaii.

The Cook Island beacon is included this month although it has been around for some time. Doug VK8KK in Darwin reports hearing it on 4th April with signals 549. The Hawaii beacon KH6EQI appears to operate nominally around 50.100, but reports indicate the frequency varies as high as 0.107. Doug has been hearing it with some regularity in Darwin with varying signal strengths, rising to 589 on 25th April at 1316 hours. It has also been heard by Ross VK4RO and David VK8AU. It is rather a frustrating signal, however, as Doug reports that if you hear the beacon and dial 4382160 in Hawaii, after eight rings or so you are phone patched across the beacon! In this state you can then work yourself? As Doug says, "Just book your trunk call to KH6 and hear yourself come back—am not impressed!" I wouldn't be either! To make matters even worse, it appears there is very little reliable 6 metre activity in KH6, with KH6GRU as the only likely one, and it is not known whether he ever listens on 52 MHz.

Further notes on the Darwin scene are that a six metre beacon will be in operation before long on 52.200. (This is very pleasing information and further details are awaited.—5LP.) Good signals to Bob C21AA many times 5 x 9 plus for hours on end—seems to be a pipeline that way! Seems as though it is double hop F2 at KH6 with C21 on the first hop. HL9WI in South Korea is being constantly worked in Darwin, along with any number of JAs, with signals being as strong as ever heard on TE. The TE starts about 2030 and goes to 2400, and is like this four nights out of five, with all districts except JA7 and JA8. Doug works quite a number on c.w. Plenty on s.s.b., but this mode still in the minority as yet in JA.

Time is short with Doug for continuing much work with MS signals to David VK8AU at Tennant Creek, but reports an improvement in signals since installing half inch foam heliax cable to the beam, which has a loss of 1.0 dB. per 100 feet at 1.8 GHz.!

ACTIVITY IN CANBERRA

VK1DA reports there are about seven stations operational on the non-net sections of 52 MHz., and half a dozen able to use the net channel of 52.525 MHz., but operation is spasmodic. On 144 MHz. there are about five stations with tunable equipment, but the only regular contacts appear to be the skeds between Eddie VK1VP and Alec VK2AAK on 144.100 MHz. u.s.b./c.w. Ten stations operate on Channel 8 f.m. with regularity, plenty not so regular. Charlie VK1CR is working Sydney stations on Channel B with fair success most nights. Keith VK2ZAA at Tumut and Paul VK2AGJ at Young generally are good copy in Canberra. Graeme VK1CG listens and calls on a.m. on 144 and 52, but there are no takers outside VK1, and the boys are beginning to wonder if anybody in Sydney operates in the lower parts of these bands.

Andrew reports it seems unlikely Canberra will have a repeater for the f.m. channels because it would not significantly improve the coverage of mobile stations in Canberra and would be a little help in increasing the coverage between mobiles in his area of the State. The locals therefore are more favourably orientated towards a beacon (excellent news—5LP) and present plans are to operate on 144.475 with 10w output, solid state, turnstile or big-wheel antenna, approx. 5 seconds of carrier, then 5 seconds of call sign in c.w., on an elevation a little above Canberra.

Finally, it is interesting to note the art of home building still comes to the fore in Canberra where at the recent Convention a competition for home-brew gear was won by Eddie VK1VP with a line up of varactor triplers and filters (144 MHz. input, 1296 MHz. output), and a 576 MHz. converter. Second was Neil VK1ZT with a 1296 MHz. converter and home-brew dish antenna. Third a two-in-one transmitter made by Graeme VK1CG with 52 and 144 MHz. transmitters in the same unit with 6/40 final each.

Brian VK9BB/4 writes from Atherton in North Queensland to say the paragraph in April "A.R." was incorrect in stating he had worked HL9WI along with VK6s, 8KK and 8AU. He has not been active on 6 metres since leaving New Guinea at the end of November. Currently he is using 146 f.m., but the main trouble seems to be his isolation v.h.f.-wise. However, he has been looking at one or two high points on the south-east edge of the Tablelands with a view to entering the Qld. V.h.f./U.h.f. Contest in May, and is constructing a sly-beam for the purpose! Brian is hoping to have some reasonable contacts into Townsville (130 miles from the best local high spot), but so far 146 signals from there are very weak.

RTTY IN VK5

Signals a little different from the usual have been heard on 144 MHz. in VK5 for awhile now, and were finally tracked down to being r.t.t.y. being used by John VK5JE at Pooraka, north of Adelaide. John would be pleased to answer any queries from anyone regarding v.h.f. r.t.t.y., teletype, equipment, etc. To assist in this and in the hope of fostering interest, with eyes across the border to other areas, write to John E. Dunkley, 9 Elva Ave., Pooraka, S.A., 5095.

VHF RTTY NET

Further to the above, John has given a lot of thought to the establishment of an r.t.t.y. net and after discussion with others tenders the following thoughts: Audio frequency shift keying (a.f.s.k.) as this is more suited to v.h.f. operation, and facilitates auto-start, etc., and receiver tuning is many times less critical than f.s.k. as used on the lower bands. He recommends 144.650 MHz. as the net frequency, being located in some of the upper areas of the 2 metre band, and as far as can be ascertained is free of other nets and beacons. (There has been such a net on 146.500 MHz. in VK3 for some two years or more.—Ed.)

METEOR SCATTER

A little more news on this interesting phase of Amateur Radio. Wally VK5ZWW has been successful in establishing contact with Rod VK2ZQJ via MS on 29th and 30th April at about 0615. Signals were considered good when only random meteor were being used, and the contacts have been good enough to record the efforts on tape. So that makes two States for Wally now by that mode. Also in on the act was David VK5ZMO who heard Rod on 30th April. The story leading up to David's efforts arose from a comment following publication of the Contest announced last month by VK-8AU when mention was made that only stations with elaborate equipment would get anywhere. Challenged to overhaul his own gear, David set about improving his receiving gear—the result—VK2ZQJ. So one never knows just what can be accomplished until you try; good luck David, you might join the ranks of those making such contacts. Wally reports that around 0600 to 0700 is the best time, particularly for random scatter contacts. He would be pleased to hear from anyone prepared to give it a go, as he is now on the path to attempting worked-all States via MS.

A further note from Wally VK5ZWW reveals there have been three known openings to JA during April, and stations were worked on two of these. He also has a tape recording of signals received from HL9WI in South Korea on 17th April on 50.100 between 1515 and 1545 hours, and the same station was heard around 1830. During a contact with JA1ODA, Wally was told JA2IIY had worked an LU3 on 15th April, but no further news of this at present.

576 MHz. NEWS

Bob VK3AOT stirred up some activity in VK3 on 576 MHz. over Easter. On Good Friday he worked Dennis VK3BDA at home at Mt. Waverley from Mt. Cowley, distance 83.5m., signals 5 x 9 plus; this just being a new VK3 record. Saturday and Sunday were spent in the Grampians on Mt. William. The path to Melbourne was a poor one, signals to VK3BDA on 144 MHz. were only S7 to S9 with QSB. Two-way contact was made on 576 MHz. 5 x 4 both ways, 143 miles. On Sunday morning, Kevin VK3ZKB went portable to Arthur's Seat, 30 miles south of Melbourne, and was contacted at S9, giving S7 in return. Distance 147.3 miles, a record. The previous VK3 record was set in 1949! Bob suggests this is a definite revival of interest in 576 MHz. (John VK5QZ, holder of the present Australian record on 576 is watching with interest!)

Further news from Bob on the VK3 scene shows that the last of the series of field days for the season held during Easter attracted 11 stations into the field. Conditions were poor and the longest contact was on 2 metres over 240 miles. It is good to see that a series of field days can be supported so well, it is difficult to get many stations into the field in VK5 on one day a year!

That very elusive VK2 station, VK2ZEO in Deniliquin, has been trying 432 with Ian VK-3ZDW, but so far no two-way QSO has been achieved. This may be a contact worth looking for by the 432 operators in VK5, giving them another State.

Continuing, Bob reports excellent 2 metre conditions during early April, when six stations from Mt. Gambier worked into Melbourne, and giving some of the lower powered Melbourne boys their first VK5 contacts. Mt. Gambier signals were also heard in Wangaratta and Deniliquin. On Monday night, the Melbourne Night Owls Club members had to content themselves with listening to VK5VF, the 2 metre beacon on Mt. Lofty, at S9, everyone in Adelaide having gone to bed! VK6VE at Albany at the same time was S1, making it the fifth observed occasion it had been heard in Melbourne for the season. The excellent conditions extended themselves to 432 MHz. and Colin VK5DK in Mt. Gambier had contacts with VK3ZDW, VK3ZBZ and VK3YDJ. Also noted that Ron VK3AKC worked Kevin VK7ZAH on 1296 on 3rd April.

As predicted in these notes awhile ago, this autumn was a time to keep a good ear on 52 MHz., and the period around Easter and the following week or so confirmed this. An urgent telephone call from John VK4ZJB in Brisbane gave me the first hint of something to come, when he advised good signals were being heard in that city from Japan for periods up to seven hours, and considered the best openings since 1959. John also mentioned in his phone call that Bob VK4ZRW in Brisbane had heard a W2 on c.w. on 6 metres. A week or so later, John made another telephone call confirming that conditions were still prevailing in VK4, but this time nothing eventuated in VK5. Many thanks for your interest John, it was worth the effort.

Bear in mind the privately sponsored V.h.f./U.h.f. Contest by David VK8AU to be held in July and details of which appeared in the April issue of "A.R."

A new station is operating from Casey Base in Antarctica with call sign VK0PF and Phil is operating on 53.540 MHz. No other details available at this stage.

That's all the news for this month. Closing with this thought. "Someone has defined courtesy as a form of polite behaviour practised by civilised people when they have time."

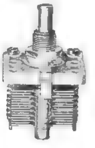
73, Eric, VK5LP. The Voice in the Hills.

EDDYSTONE

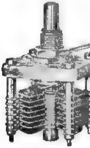
CAPACITOR CATALOGUE

CERAMIC MICRODENSERS ON 1-5/16" END-PLATE

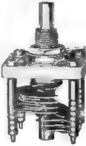
Cat. No. 589



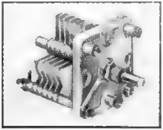
Cat. No. 584



Cat. No. 583



Cat. No. 817

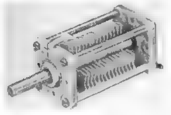


A comprehensive range of variable capacitors, well designed electrically and mechanically, and intended to stand up to continuous usage under all reasonable conditions. The types include single-section, split-stator, butterfly and differential capacitors.

Cat. No.	Type	Capacitance (pF.) Min.	Capacitance (pF.) Max.	Proof Voltage	Air Gap (ins.)	No. of Vanes Rotor	No. of Vanes Stator	Price
478	180 deg. Split-Stator	3.25* 2†	15 7.5	990 1,750	0.020 0.020	2*	2*	$3.51
580	Single Section	4	13.5	2,300	0.062	4	4	$3.73
581	Single Section	4	63	780	0.020	8	7	$3.95
582	Single Section	4	66	990	0.020	8	7	$3.88
583	180 deg. Split-Stator	4* 3†	23 12	830 1,600	0.020	3*	3*	$3.95
584	Butterfly	7* 4†	32 16	870 1,740	0.020	8	7*	$4.34
585	Single Section	4.5	91	780	0.015	11	10	$4.61
586	Single Section	5	140	600	0.015	16	15	$5.20
587	Butterfly	6	16	1,740 3,300	0.032	8	7* 7*	$4.83
588	Single Section	5	27.5	1,650	0.052	8	7	$4.17
589	Single Section	5	60	1,600	0.030	11	10	$4.61
719	Differential	3.25	28	950	0.020	4	3*	$3.84
739	Butterfly	4.25* —†	10 —	2,000 3,700	0.052	5	4* 4*	$3.85

TRANSMITTING VARIABLE CONDENSERS

Cat. No.	Type	Capacitance (pF.) Min.	Capacitance (pF.) Max.	Proof Voltage	Air Gap (ins.)	No. of Vanes Rotor	No. of Vanes Stator	Price
815	Single Section	7.5	67	1,700	0.046	7	6	$7.90
816	Single Section	9	192	1,000	0.024	10	9	$8.18
817	Single Section	10	270	1,100	0.024	14	13	$8.46



HIGH STABILITY TYPE

This pattern, Cat. No. 738, has double end-plates, 1-5/16 in. square, and double bearings, making it particularly suitable for high stability oscillator applications. Single section type, silver-plated finish. Max. Capacity: 93 pF.; Min. Capacity: 8 pF.; Air Gap: 0.03-in.; Proof Voltage: 1200.

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MINIATURE MICRODENSERS

Particularly suitable for VHF applications and where space is restricted. Robust construction. Two-hole fitting, using parts supplied.

Cat. No.	Type	Capacitance (pF.) Min.	Capacitance (pF.) Max.	Proof Voltage	Air Gap (ins.)	No. of Vanes Rotor	No. of Vanes Stator	Price
551	Butterfly	4.5* 2.8†	28.5 14.5	500	0.01	10*	9*	$3.73
552	180 deg. Split-Stator	3.5* 2.0†	21.5 11.5	500	0.01	4*	4*	$3.63
553	Single Section	3.5	54	500	0.01	10	9	$3.26

* Per Section. † Series Gap.

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W.A.: 34 WOLYA WAY, BALGA, 6061. Phone 49-4919
Telex Melb. 31447; Sydney 21707

DX

Sub-Editor: DON GRANTLEY
P.O. Box 222, Penrith, N.S.W., 2750
(All times in GMT)

It is very pleasing to note quite a large increase in the numbers of letters arriving at this QTH, most of which have been from the VK4 gang. Many thanks to all who have taken the trouble to write.

The most interesting development in the past weeks has been the upsurge of activity on 40 metres, and according to George ZL2AFZ, 80 also. Maybe it's because 20 has deteriorated and sent the DX down to the lower bands, or that the lower frequencies have improved. Regardless of the reason, the result is that much really good DX can be heard and worked on these two bands.

I have no actual reports of stations working on 80 at the time of writing, however I do have some good reports from 40. Mac Hilliard listening at Campsie, a Sydney suburb, reported a nest of South Americans and others on 40 s.s.b. a few nights ago, among them were PY5, CO2, LU7, CE3, 6W8 and XL7. George ZL2AFZ lists 7X2, VO2, UF6, UA, OY3, KL7, JA, GD3, CN8, KX6, VP2AA, MP4, VP2VI, VP2GLE, CR4, EA8, OA8, YN, EP2 and many others active on 20, but at the same time CE, CO, CE0, PJ, UI8, UL7, UO5, VO2, YA, YN, ZS5, KZ5 and HI plus many Ws and VEs were making life interesting on 40 metres. I personally logged KL7, VE, W, JA, UA0, UA9, TEK, YU, LZ, HA, EA, SP, UF6, DK and G in one brief session on 40.

George ZL2AFZ reports a steep decline in the sunspot numbers, and lists the following figures: March 1969 the figure was 108, March 1970 93, March 1971 70 was the predicted count, whilst figures for next March are estimated at 48, for 1973 the estimation is 33, 1974 should be 20, going down to 10 the following year.

If you worked JD1ABX or ABS from March 17, please forward your QSLs with SAE IRC to Nob Itoh, Box 7, Aobadai, Yokohama, 227, Japan. The stations were active from that date for a short period, and were located on Hahajima Is. formerly Bonin Is.

ZL5AX is occasionally active from the ZL Antarctic using 14020 at the week-ends. His operating times are dependent on official duties, but he has been noted at 0300z.

Two notes to hand, one from VK5KO, other from VK4VX re the activity of 3B7DA on St. Brandon. Firstly, Reg VK4VX passes on the word that Alex will be going to Rodriques in June, but to date no further information is available. Secondly, it appears that Alex wants QSLs for contacts made with the VK boys, and John VK5KO asks me to make it known that if any VK wants the 3B7DA QSL, forward plus a stamped addressed envelope to him, John de Cure, 10 Portland Ct., Fulham, S.A., and the card will be sent to you when received from Alex. Should you want to send it direct, the address is Alex Mootoo, 3B8DA, 39 Brown Sequard Ave., Vacoa, Mauritius, Indian Ocean.

The following comes from Alf VK2LC who passes on this information received from K5KA: Larry VK9NP, who is ex-K2IXP, has left Townsville for Melissa Reef and will be operating from there for some time. The operation has been approved by the A.R.R.L. as a new country.

DL7FT will leave Berlin on May 24 to operate from an hotel in Albania using the call sign ZA2RPS. He will operate until June 7 with a 3 element beam using the following frequencies: c.w. transmit 14005 and 21005, receive 14050 and 21050. Transceive on 28050. On s.s.b. he will transmit on 14195 and 21245, receiving on 14230 and 21300. He may transmit also on 14195.

ZM7AG is on almost daily for Ws using 14217, and for others on 14180. Usually comes on at 0400z, remaining on for an hour and sometimes much longer. His name is Jim Sheedy and as he is a school teacher he will be there for some time. (Further to Alf's note, there is a memo in Geoff Watts bulletin of Mar. 17 reporting that the International DX Assn were sending gear to a school teacher at that location, so if this is the case the QSLs will go to that body. Don Sub-Ed.)

Finally Alf reports that VR5DK is due on from mid April for an unknown time, FR7ZU/T will be active for two months from Mar. 14, XW8AX will operate from Cambodia for the next two months or so, and VS9MM is a newie on the Maldives.

Two long and interesting letters from John VK4QA, of Woody Pt., Qld. John has been very active and since March he has listed the following as worked on 20 mx: FG7, PJ, XR8, OE, M1B Mario whose QSL manager is WA3HUP and whom I believe will QSL via the bureau, F, PA0, JD1YAA (via J.A.R.L.), KG6JC (via (W2RDD), UK5, HA5, PJ9VR (Box 283, Curacao, Neth. Antilles), YO, SP6, ZC4, 5W1AH (QSL to VE7BWG), FO8CK (who speaks only French; 151, M1D (QSL to I1MKN, VP9, VP2GBG (QSL VE3DLC), HC, CR4AJ, ZA8, 5H3, ON4, PZ5AA Willy (QSL to Box 1310, Moengo, Surinam or the bureau). John also worked Guy VE8MD, whose exact location is in Zone 2 on Isachsen Isl. in North West Canada, 300m. north of Magnetic Nth. Pole and about 800m. south of the Georgraphical North Pole.

In passing, John mentions that VE7WT has been having trouble getting QSLs from rare VK stations in the VK9 and VK0 call areas. QSLs have been sent to managers and direct to the stations concerned to no avail. Personally, I find this hard to understand. I have never missed out on a card from the VK0 area and to date most of my VK9s have replied. In fact I have found the VK9 boys most courteous and helpful, and I suggest that VE7WT has tried the wrong ones.

Mentioned earlier that Larry VK9NP had gone to another QTH, but his Norfolk Is. QSLs can go to K2RLY, 35 Allview Dr., Ellicott City, M.D., U.S.A.

Clipperton Is. has again emerged as a strong possibility, with FO1XT hoping to take a KWM2 and tribander there in the spring, and F2QQ hoping to make it this month (April). I prefer to wait and see, as this one has been the basis of far too many rumors.

JY has been in the news sheets far more than any other country over the past twelve months and it is now reported that King Hussien JY1 is often in the Arabian net with ST2SA, SU1MA, YK1AA, etc., on 14300 s.s.b. at 0630z. JY1/B skeds WA3HUP 21350 on Sat. and Sundays at 1600z, whilst JY2 Princess Muna is often on 14230/300 at 1700z. QSLs for all three now go to Mary WA3HUP.

Finland Postal Authorities have now stated that all operation from Market Reef must use OH0 prefix, and the word is that the country has been deleted from the DXCC list.

Still a lot of activity from the VP prefixes, VP2EQ on regularly from Anguilla, QSL to WB2ZMK. VP2EZ from the same location until May 1 has WA9VOL as manager; VP2MY was due to go QRT from March 5, and all QSLs for his operation should go to W1DXL. VP2LG has been operating on 28500 of late and his cards should go direct to Box 330, St. Lucia. Also active from there is VP2LT. VP2JA was the call used by the Ws who went to Turks and Caicos during March 27 contest week-end. QSL manager for the operation is K4DSN, Howard Kelsey, 4563 Sapphire Dr., Jacksonville, Fla., 32208.

The WA5UHR Golden Microphone of the Month award for QSL manager of the month of February was awarded to KH6GLU, Ed de Young, who is well known for his handling of the Pacific and DX Net, and the QSL chores connected with it.

The special prefixes PP, PV, PW and PX were made available to PY stations during the WPX contest on the week-end of March 27. QSLs for any station using one of these prefixes should go to their PY call.

Another special station was WC4SFF, which was operating during February of this year at the South Florida Fair. The QSLs should go to Box 461, Lake North, Florida, 33480, U.S.A.

Kevin ZK1BM has been in the Pacific Net on occasions, and all his QSLs should go to W7VRO who will also handle cards for ZK1CE after 23/2/71.

With reference to the QSL managers living in the States, I get quite a lot of letters asking for the QTH of these chaps. Unfortunately I do not have an upto date W call book here, and I am unable to help. My call book is about 10 years old, and as well as being obsolete in the usual sense of the word, it does not carry the zip codes without which letters are often returned. As mentioned earlier, I have the DX News sheets from Geoff Watts covering the last two years and can pass on any information from these. But U.S.A. calls, I can't assist you with.

CR8AK was due to be activated by a JA over the WPX week-end and the following two days. The operator was JA1AEA, Jim Suzuki, 6-9-14 Kanamachi, Katsushika, Tokyo 125, Japan, to whom all QSLs should be sent.

The current operation from FM7WN which seems to be on all bands at any old time has DJ6ZB as general QSL manager, whilst K2KGB will handle QSLs for the American gang only.

From San Andreas we have some QSL information, firstly the current HK0BKX operation has WA6AHF as manager, whilst the QSLs for the operation over the last week in Jan. are a little more complicated. K8CQV and W8UCW both operated as /HK0 and their manager is W8GDQ. The other two using the HK0 suffix were K8HKB and W0KUS, and in each case the cards go to the home call.

Three more prefixes for the WPX week-end, HU0A was YS2CZN on 14 s.s.b., QSL to WA5TDY. HW6KAW was a special operation by F6KAW, QSLs to Radio Club DX d'Ivory, 8 Rue St., St. Just, Tour F 94 Ivry-sur-Siene, France. The IC prefix was due to be used on April 12 by IC1AA, 8EZ and ZGY from S. Pietro Is. QSLs to DXOTC, Box 143, Palermo Sicily, plus three IRCs.

Further to the operation from Navassa Is. from Feb. 8 to 12 by W0EXD/KC4, it has been confirmed that the QSL chores will be handled by W4OHP.

Some stations currently operating from U.S. islands in the Pacific are KG6SI, QSL to WA6AHF, and KG6SW, QSL to W7YWX, both on Saipan in the Marianas. Geoff Watts newssheet lists KG6SW as having W7YBX as manager and is probably right. KC6WS is on Yap in the Western Carolines, QSL to the operator's home call W3FDP. From Johnston Is., WB6MQB/KJ6 is active, manager being WB6HDG. WA1ARF/KS4 is listed in the Long Is. DX Assn. bulletin as being active from Swan Is. where they are working. The operation is not a DX-pedition, and they are only on when their work schedule permits. QSLs go to WA5MWG.

MP4MBB has regular skeds with MP4BHH and K4MQG on 14340 s.s.b. at 1230z on the long path to U.S.A. He is in the British Commonwealth Net on 21254 daily at 1430z, and accepts skeds via his QSL manager G3LQP.

9M6HM is shortly due to return home, but if you want a contact with him, try via his QSL manager K8ZIF, he is often around 14030 or 21030 c.w. only. In the same direction, 9M8OKA Chuck has been reported in the States on 14300 and 240 s.s.b. His address is Box 795, Kuching, Sarawak.

There has been recent activity from Comoro Is. during the French contest, FH8CY, Box 436, Moroni; FH8CG, Box 135, Moroni, and FH8CE, Box 368, Moroni, being the main stations.

FR7ZP/E from Europa, name Maxime, has a daily sked with JA6CUV/1, probably on 14195 at around 1300z, but reports from the States say his signal is very weak.

The ID1 prefixes used over Mar. 19 to 21 are valid for Islands of the Air Award, Prefix Hunters, and Worked Italian Islands. The islands are situated in the Southern Adriatic Sea between YU and Italy and do not count as a separate country. QSL arrangements for the ID operation say send cards to I1BUP, another says send to I1BGJ, and another says either. So take your pick on this one. If you are not in a hurry and want to use the bureau, send them via the I.S.W.L. Bureau in England, or if you prefer, send them to me and I will mail them on, as I have a regular despatch to that Bureau.

Recently TJ1AW operated from the Cameroons during an important contest. During his activity on 10 metres c.w. he was reportedly subjected to much deliberate QRM as were many other rare DX stations who happened to be in demand. This is just another one of those unpleasant chapters which happen when a mob of jealous incompetent operators who are quite incapable of operating a station do their utmost to prevent the other chap from doing his best. It is not confined to contest operation or DX chasing either. Many of these louts forget that an experienced operator can more often than not identify a signal, and by this I mean a c.w. signal, and if they regularly listen around the bands it won't take long to identify the offenders, unless of course the troublemaker is a pirate. Once identified, the only action as far as I am concerned would be to blacklist him. This is a term which I don't like, but when our pleasure is being ruined by a lot of selfish characters, then drastic action is the only answer. The basis of the above comment is taken from the Long Island DX Assn. bulletin.

YO4WU and YO4UJ, Sever and Maria Diaconu, now have a stateside QSL manager, WB2TSB, R. Tygar, 5 Chelmsford Dr., Wyandanch, N.Y. 11798, U.S.A.

Finally, and to clarify any misunderstandings which may be floating around, I have resigned from the VK2 Division after having been a member of it since 1957. The reason is personal, but as a result of this, it is only fair that I should cease to write for this magazine, and the Editor has been notified accordingly. I have indicated, however, that I am prepared to remain on the job until a suitable replacement becomes available. I stress the word suitable, as there is a lot of work involved, also I feel that despite what the individual Divisions think about work on "A.R." being spread over the various States, the various Sub-Editors should be situated in the same State as the magazine. This would obviate any unnecessary delays due to mail hold-ups, and also have the Sub-Editors in close contact with the general Editor. 73, de Don.

Overseas Magazine Review

Compiled by Syd Clark, VK3ASC and R. L. Gunther, VK7RG

FEEDBACK

Relevant to the review published in the April "A.R." for "Ham Radio," Jan. 1971, in my haste to defend antenna couplers I overlooked something important in WB3GQY's article, "Inexpensive SWR Indicator". I wish to comment on it here, because of some important principles involved.

In that article a primitive "SWR Meter" is supposedly obtained by a detector fed from a loop slipped around co-axial cable. The loop is run back and forth along the co-ax, supposedly to measure the distance between standing waves.

Unfortunately for this cunning idea, standing waves in a co-axial cable are confined to its inside surfaces. It is most dubious whether this can, as the author suggests, be reflected by a kind-of leakage or induction to the outer surface of the braid—thereby to be picked up by his loop.

Any such outer-surface v.s.w.r. would be a function solely of antenna unbalance, with the principal consequences of distortion of the antenna pattern, and of radiation from (and pick-up by) the transmission line. The cure is simple: use a suitable balun. This subject was discussed at length in 1968 issues of the "Australian EEB"—and so I certainly ought to have spotted the error sooner!

It is not sufficiently appreciated that antenna matching involves two variables: matching the line to the antenna (or conversely), and matching the transmitter to the line. If the line is not terminated in its characteristic impedance it will develop standing waves. As W5JJ has pointed out in recent Amateur literature (e.g. "EEB" April 1971), these will have relatively little consequence for v.s.w.r. less than 5:1 at frequencies less than 30 MHz. in terms of power loss, but they do complicate transmitter matching by presenting it with an indeterminate reactive load. Thus the usefulness of the antenna coupler becomes evident, which acts also to filter harmonics even in an ideally matched system.

Aside from the over-rated role of s.w.r. at h.f., the fact still remains that s.w.r. readings from a directional coupler (reflectometer) type bridge can be misleading (as discussed widely during the past few years). In addition, optimum antenna-to-line matching depends on a depressingly large number of difficulty controllable variables—as discussed most interestingly in the October 1970 issue of "Spectrum" (N.Z.), in the article "SWR 1:1, Fact or Fiction"

The answer to proper antenna matching is, of course, the use of suitable instrumentation, e.g. the Antenna Noise Bridge ("QST" 12/67, "H.R." 12/70), r.f. bridge with slotted line ("H.R." 10/70), or "Antennascope" type of insertable r.f. bridge (Orr Radio Handbook). See also "Comments" in "Ham Radio" of November 1970 with a very interesting exchange between a correspondent and an author on the real meaning of reflected power.—VK7RG.

AUSTRALIAN EEB

December 1970—

FET Conversion of BC221 Heterodyne Frequency Meter, I. N. Kallam, VK2. Useful information of great interest to those without instruction books.

A C-D Ignition with Automatic Changeover, T Vieritz, VK4. Said to add zest to tired motor cars.

Commonsense Transmitter Loading, C. C. Drumeller, W5JJ. If your transmitter does not load properly, this is for you.

February 1971—

A Tachometer for Capacitor Discharge Ignitions, VK7ZAR. More on "solid state" systems for motor vehicles.

A Nice Phase-Modulated Two Watt Two Metre Transmitter, L. Osborn. Small, neat and tidy.

A Sythe-Stone Zener, T. M. Palmer, VK2. This worried me for a while and then I realised that I would spell it Scythe. It seems that silicon carbide sharpening stones have zener properties.

The Use of Avalanche Diodes, VK7RG. An interesting dissertation on diodes and a means of checking unmarked units.

BREAK-IN

Jan.-Feb. 1971—

The Christchurch VHF Repeater. All valve job, neatly packaged.

R.S.G.B. Two Metre MOSFET Converter. ZL1TAU tells how they made this a V.h.f. Group project.

Solid State Quick Check, ZL1TAT. Tells the user whether or not the transistor function is okay or not. Naturally it also checks diodes. In or out of circuit, powered or unpowered.

March 1971—

Direct Reading Capacitance Meter, ZL2ADE. Reprint from "H.R." Apr. '70. Covers 0-10 pF. and 0-1 uF. in six ranges with linear scale. Accuracy claimed to be plus or minus 5%.

Transistor Checking with an Ohmmeter, ZL-2AHP. Identifies the types, silicon or germanium, NPN or PNP and checks which lead is which.

Teleprinter Equipment Speed Control Data, ZL2ALW. How you can do something about getting your teleprinter operating at the correct speeds.

CQ

November 1970—

Electronic Keyers—1970, W4MXK. Modern IC circuits of simple and iambic keyers for use in keying transmitters. A 2N3440 transistor is used as the keying element. Stated to be suitable for grid block or cathode keying.

The LSD (Lightweight, Sturdy, Discone). An omni-directional v.h.f./u.h.f. antenna.

Review of Drake SPR-4 Com. Receiver, by W2AEF. Described as "a versatile solid state job for operation with a.m., s.s.b., c.w. or r.t.t.y. on 24 selected 500 KHz. segments in the range 150 KHz. to 30 MHz.

A Simple D.C. Voltage Dropper, W2FEZ. Using a six-volt tape recorder from a 12 volt battery

Evolution of the Decibel, Part 2, K2BZ. The concluding article in a two-part series describing an every-day approach to understanding the "decibel"

Improving the Kiee 133 Transceiver, W3CWV. Some of these were sold in VK so there may be men who are interested. The power supply offers regulated rx/tx 250v. h.t. The National NCX-A power supply is similar, but without the regulation.

December 1970—

A Solid State Comm. Receiver, I1TDJ. FET front using TIS34s, tunable i.f. on 3.5 MHz. followed by mech. filter i.f. on 250 KHz. Uses Command set parts in tunable i.f.

An Inexpensive Utility Antenna for 80 Mx, W8SAI Simple certainly!

A Digitally Divided Frequency Standard for Lab. or Receiver, W1FZU Using four Motorola ICs, this unit gives outputs on 1 MHz., 100, 50 or 25 KHz. and 5 KHz. Signals are stated to be readable up to at least 100 MHz.

In Defence of CW, W8EG. Should be read by all who feel that it should be dropped as a requirement for Amateur status.

Keyed Solid State Oscillators, Di Ming Lee. Transistors also drift, the reasons for the drift are different and it can be minimised. Here's how!

An AZ-EL Antenna Mount for Satellite Tracking, W2AEF. Uses two R.C.A. rotators, one on each axis. The rotators are sold here by R. H. Cunningham & Co. under the brand name "Stolle".

An FET RF Attenuator, W2EEY A useful device to avoid receiver overload effects due to strong signals. One of the circuits in Fig. 2 lacks a return path leaving the 5 to 9v. battery "up in the air".

Improving the Ham-M Rotor Indicator, by VK5GN. The use of a simple voltage regulated supply keeps indications "on the beam".

January 1971—

QSK with the Heath SB-Series Equipment, K4DC. True break-in operation is not only desirable for high speed c.w. rag chewing, but is a must for fast, efficient traffic handling. Simple modifications enable such operation without sacrificing ease of operation in the s.s.b. mode.

F.M., K9STH/3. An introduction to the joys and frustrations of this mode.

Crystal Calibrators, How Solid is a Rock, K3STU Understanding how to calibrate a calibrator and check it periodically, ensures that it will keep you where you wish to be in the band of your choice.

The Mono-Loop Triband Quad, VK2AOU. Operating principles and two element quad [illegible] details.

Sunspot Cycle 20, Progress 1970, Prediction 1971, W3ASK. Enables you to decide the most productive operating times and arrange, in advance, to be there.

An Aural Diode Transistor Tester, W2EEY. This tester provides a simple aural indication of resistance values so one can concentrate on the components being measured without the interruption of having to examine a meter scale every time a test connection is changed.

February 1971—

An Introduction to VHF FM. Sub-titled f.m. techniques for non-f.m'ers, W6HPH/G. F.m. offers several significant technical advantages over conventional a.m. and some over s.s.b. The author describes the merits of f.m. and the construction of two accessory devices to receive and transmit f.m. on the v.h.f. bands.

F.M., K9STH/3. Feature.

Calibrating FM Deviation, VE2AQX. Describes the Bessel Zero Method of calibration which is an absolute method of calibration.

The Table Top Maxi Linear, W6KI. A 3CX1000A7 for 80, 40 and 20 metres.

OHM—The Oriental Ham Magazine

Nov.-Dec. 1970—

This is a racy little magazine which is published in Hong Kong and is usually filled with pictures and jottings about the goings on in Asia generally. This issue carries the news under "JA Govt. Bends" that Japan is likely to approve reciprocal licensing in the near future. No doubt this will boost her image.

Watch Those Cards, ZM2AFZ. Discusses the difficulties of getting cards from rare countries and methods of achieving the near impossible. Of course, if you were one of two or three Amateurs in some countries perhaps you might feel the problem is yours in coping with requests.

The technical content is "**The G5RV**" by G5RV. Many Amateurs know this antenna quite well as it allows all band operation with one antenna from a location of limited extent. Do VKs know that G5RV is now VK9LV?

January 1971—

Electronic Keyers, VS6AM describes a simple unit using a single transistor and about a dozen other components. Operation is from a 9v. battery.

The balance of this issue is given over to stories of various happenings from here and there, mainly in the Orient.

QST

November 1970—

An Advanced General Coverage Amateur Receiver, W8BD. A very interesting specification for those who still have stocks of tubes they wish to use.

160-80-75 Metre Broad Band Inverted Vee Antenna, W2PV, who offers his analysis of how the system operates and shows how to construct a practical two band version of this effective antenna.

A VFO for 50 Through 16 Metres, Di Ming Lee Here is an idea article showing how to use varactor and PIN diodes to tune and switch a variable frequency oscillator

A 2-500Z Grounded-Grid Amplifier for 50 MHz., W1QVF and W1HDQ. Simple high power for owners of medium powered exciters.

A Station Control Unit for the Blind Amateur, W1ICP The first integrated control unit for the blind. With it the handicapped Amateur needs only rx, tx and antenna.

December 1970—

A Second Generation MOSFET Receiver, by W7ZOI. Those of you who are seeking a modern design should be interested in this one. Single conversion, MOSFET mixer with 9 MHz. i.f. and 5.5 MHz. local oscillator using Command transmitter components. A compact and sensitive receiver for 80 and 20 metres.

An Attenuator Box for Audio, W2HG. Very useful for measurement of amplifier gain and other audio jobs.

Some Notes on the Design and Construction of Grounded-Grid Linear Amplifiers, W1KLK and W1ETU/4 If you have a spare 3-1000Z doing nothing you can put it to work. There is a second version using a pair of 3-500Zs for good measure.

A Wide-spaced Multi-element Tribander, W1FBY. Measuring 35 ft. 6 in. along the 20 mx reflector and 25 ft. plus on the boom, this is quite a lot for an antenna raising party to handle.

Spakey, K8ORD. A controlled-space IC keyer.

A High Output VFO for a Beginner's Transmitter, WA3EOK. Output is on 3.5-4 and 7-7.3 MHz. Includes a 2w amp. and broadband r.f. transformer Solid state.

Midlatitude Intense Sporadic-E Propagation, W1DEI and W2BOC, Part 1. Causes and results. The result of observations made since the 1930s.

Recent Equipment: The Drake SPR-4 Receiver, W1KLK. 500 KHz. to 30 MHz. in bands 500 KHz. wide. In standard form it covers broadcast and international short wave broadcast bands. Obviously, if you wish to fit appropriate crystals it will cover any of the other segments also. I.f's are on 5645 and 50 KHz.

January 1971—

More Thoughts on Solid State Receiver Design, W1CER. Here are some ideas which should interest the v.h.f. man who wishes to operate 10, 6 and 2 mx while using a single piece of receiving equipment. The up-converting technique described in this article permits coverage of the h.f. bands from 160-15 mx plus WWV and provides birdie-free reception by using oscillator frequencies which fall above the tunable i.f. range of the main receiver.

Receiving F.M., W1KLK, Part 1. Basic principles and circuits.

The Compact-A-Test, G5PP. A complete test instrument for the Amateur station.

The Morse-A-Verter, W7GHM/4. This device will enable a teletypewriter to print characters at any speed from 5-60 words per minute from hand or machine sent morse. All solid state. (Seems to be a much more practical item than the much older valve types which were offered commercially a few years ago. Mate one of these with a typewriter keyboard type keyer and anyone could beat the code bogie.)

Five for Five, K4MI. A simple two element "shortened ZL-Special" designed for a centre frequency of 14.175 MHz.

PEP, Average Power, and Related Matters, W4PPB. Explains the meanings of the terms and how they are related.

Ham Radio Broadens Horizons for the Handicapped, W0QXA. Describes how many physically handicapped people can gain great benefit from Amateur Radio.

CW Communications for the Deaf, WB2KJI describes a small device made by Western Electric to enable deaf people to know when they are being called by phone.

February 1971—

Quad v. Triband Yagi, W4FRU. Performance comparisons between these two popular antennas.

Quick and Easy Portable/Mobile Reception, W1CER. A new twist to converters, operating into a "squark box".

Receiving F.M. Part 2 of W1KLK's article. Describes several f.m. receiving adaptors for use with communications receivers and reviews a number of new f.m. discriminator designs.

New Ideas for the Two Metre Kilowatt, by W1QVF and W1HDQ. Easy to make tank circuit with an improved tuning device. Tubes used are a pair of 4CX250Rs in push-pull.

Integrated Circuit Flip-Flops, WA6KGP. The author describes the various types of Flip-Flop and tells the reader who makes them.

The ATR-160, K1RPB. Part 1 of a two-part article describing a home made transceiver for 160 to 6 metres, with provision for v.h.f. transverters too. It is a valve design.

A 15 Metre Beam "On A Budget", W7PDT tells how he constructed such a beam from split conduit. Total cost is stated to have been $15.

March 1971—

The Editorial this month deals with the "Ups and Downs" in Amateur Radio in U.S.A. The writer seems to think, and provides figures to support his claims, that Amateur Radio is growing once again.

A Bearing and Distance Calculator, KL7EVO. Describes a method of calculating both bearing and distance to ensure that your signals are most likely to produce the results you require.

Converting the HT-41 for 572-Bs, W4DWK/W1CQS. If you have an HT-41 and it has gone through the 7094s here is an answer to the tube problem.

A 75/80 Metre Vertical Antenna Square Array, W2PV. So you can aim those lower frequency signals.

An F.M. Pip-Squeak for Two Metres, W1CER describes a two watt, solid state transmitter using four transistors.

A Ten Watt One-Tube Transmitter, W1ICP and W1NPG. Using a 6T9, this is designed for the c.w. newcomer to Amateur Radio.

I.T.U. I.T.U.

TOM CLARKSON, ZL2AZ

will be attending the World Administrative Space Conference in Geneva this month on behalf of I.A.R.U. Region III.

International Telecommunications Union

Receiving F.M., Part 3. W1KLK on basic principles and circuits. An IC receiver is described.

A Solid State SSTV Monitor, W9LUO. A magnetically deflected s.s.t.v. monitor that provides good picture quality and stable performance. Tube is a 5FP7 and e.h.t supply is of the pulse type.

A Field Day AC Power Monitor, K1PLP describes a unit to read frequency and voltage.

The ATR-166, K1RPB. Part 2 covers the fabrication and alignment of the unit.

Curtis EK-39M Memonic Electronic Keyer, K1PLP and W1FBY review this unit for making c.w. easier to send. Sells in the U.S. for $180 or $240, depending upon whether or not you buy the custom memory with it.

Midlatitude Intense Sporadic-E Propagation, W1DEI/W2BOC. Part 2. Here the author shows how Es clouds can be tracked from oblique propagation data reported by amateur observers and plots cloud sources and movements.

Amateur Space Communications — A Status Report, WA2INB and K3JTE. Up to date information on what is happening in the Amateur satellite world. (Includes picture of VK3KI.)

RADIO COMMUNICATION

January 1971—

Trapezoid Modulation in Amateur Transmitters, HA5WH. In recent years a new type of modulation, trapezoid modulation, has been used in a.m. s.w. broadcasting. The method is investigated and ideas given about employment on main bands.

A VFO for 2 Mx with a Pye Cambridge, G3YFZ. Uses an MPF105.

The One Transistor Wob-bulator, G3XGP. If you already own a c.r.o. this will enable you to quickly align any receiver i.f. to which the oscillator will tune.

Microwaves, 1,000 MHz. and Up, G3RPE. The arguments of horizontal versus vertical polarisation in the s.h.f. regions.

Flare-Spot, Part 2. G3BGL tells how the gang was rounded up. A story about reflection of radio (t.v.) signals from aircraft in flight.

Technical Topics, G3VA. Subjects discussed by Pat this month are: Double-balanced cross-coupled mixers, improved bipolar v.h.f. tuner, reciprocal mixing, intermodulation responses, batteries, continuous stand-by power source, amplified zener, parametric-mode frequency multipliers, transequatorial, auroral and propagation miscellana, suppressed zero voltmeter, proportional temperature control, slow scan t.v. activity, and here and there.

SHORT WAVE MAGAZINE

January 1971—

The Trio JR-310 Receiver, G3DNF. Reporting on an addition to the well known range with some ideas and suggestions.

The Antennascope. Useful test instrument. This is a type of radio frequency bridge which is extremely useful for antenna work. It was originally described in "CQ" if my memory is correct and the circuit is also to be found in recent editions of the "Radio Handbook".

Selectivity for CW Reception, G6HL. Getting really sharp performance. The author uses a mixer after a 455 KHz. i.f. and converts to 30 KHz. to get really sharp selectivity for c.w. work. Strangely enough, one of the more recent German communications receiver designs converts directly from signal frequency to 30 KHz.

Mod for the AT5, G3TYJ. This small transmitter is not known in Australia. The author's modification tapped the pi network tank coil so that there was only one 160 or 80 metre Amateur band within the tuning range of the tank capacitor.

Experimental Aerial Tuning Unit, G3OHK. A matching network for vertical aerials.

Extending Use of Beams, VK5WD. Modification methods for multi-band operation. Using a beam on a band for which it was not designed.

73

March 1971—

Integrated Circuit Audio Filter, W2EEY/DL. Miniaturisation reaches audio filters. All functions are achieved by capacitances alone, at about $30 a pop. The Feb. "Ham Radio" goes one step further in describing capacitance-derived circuits which actually simulate inductances by "gyration" or controlled-phase-shift inversion.

Integrated Circuit 6 Metre Converter by WB4KMB. No neutralisation needed, and gives better gain than valves or FETs. Connect eight terminals and you have constructed a converter.

Trap-type Vertical Antennas, W2EEY. Commercial centre-loaded h.f. antennas can be used on 2 mx by adding several tuning stubs to improve phasing (for optimum pattern) and matching.

Resurrecting a Grand-daddy, K6BIJ. This chap reckons he has discovered the direct conversion receiver, variation using crystal diode mixer. He has the germ of a fine idea, but he has omitted a few important details, beware! See "EEB" April 1971.

Digital Frequency Counters, W0LMD. How to do it.

Identifying Surplus Electronic Equipment, W6DDB. An index to the coding used in such equipment. Could be quite useful when needed.

The Horizontal Output Linear, W2AOO. Six t.v. valves in parallel.

Repeater Audio Mixer, W1ELU. Uses an IC and three FETs.

Something New in PC Construction, K6MVH. The use of self-adhesive metal strip; what is "new" appears to be the fact that this "kit" comes with the holes already drilled. Could be quite convenient if a lot of ICs are to be used and if you dislike work. A much cheaper and more versatile substitute for p.c. technique is the use of Sellotape Copper Foil No. 842, as described in the Feb. "EEB".

Reading 5-Code RTTY in Binary, WB2MPZ. A useful method of reading the character directly from the paper tape of a teletype punched tape.

The Coat-hanger Ground Plane, K5MVH. The useful (?) part of this article is the interesting suggestion that when a ground plane is mounted on a mountain, a lower useful angle of radiation can be achieved if the ground plane antenna is mounted upside down, so says the author. Wonder what it would do at sea level.

Reducing Mobile Noise, VE3FGS. Run a separate by-passed power lead, and use a relay.

☆

AUSTRALIS BALLOON FLIGHTS

(Continued from Page 17)

It is hoped that several channels of the RTTY telemetry system can be flown on one or more of the next series of HIBAL flights, which will probably occur in June or July. Details of these proposed flights will be put on the VK3 and VK5 Divisional broadcasts early in June. Unfortunately, the present balloon launching site at Mildura does not permit other Divisions to actively participate in these balloon flights, but it is hoped that they will continue to follow the flights with interest—they are, after all, relatively short range tests and demonstrations of greater things to come with the satellite.

The prototype telemetry unit for AO6 was shipped to the U.S.A. (A.M.S.A.T.) during April for testing. Work is proceeding on the translator units.

Some of the Divisional Co-ordinators are: N.S.W., VK2RX; Qld., VK4ZGL; and S.A., VK5NZ.

☆

CALL SIGNS

(Continued from Page 13)

VK3AWO—A. W. Oakes. Deceased.
VK3YEE—E. R. Russell. Now VK3BER.
VK4GK—A. H. McKenzie. Not renewed.
VK4HR—H. Sholz. Not renewed.
VK4JB—O. E. Alder. Not renewed.
VK4LS—L. B. Simpson. Not renewed.
VK4RY—W. L. Hartson. Not renewed.
VK4ZDF—D. G. Hopkins. Now VK4ZF/T.
VK5KR—V. M. Reeves. Not renewed.
VK5PN—W. L. Pearn. Not renewed.
VK5RE—H. H. Hobcroft. Not renewed.
VK5TV—A. T. Brumhead. Not renewed.
VK5UW—R. F. Daniels. Now VK2ADA.
VK5ZBP/T—A. W. Pierson. Not renewed.
VK5ZBT—A. F. Raftery. Now VK5BW.
VK5ZRZ—W. S. Baynes. Transferred to N.S.W.
VK5ZSW—R. H. Whellum. Now VK8ZSW.
VK5ZWM—W. D. Moulton. Now VK5WS.
VK6DJ—W. D. Jackson. Not renewed.
VK6ZAM—G. E. Maxfield. Not renewed.
VK6ZFS—N. D. Stephen. Now VK6ND.
VK7DC—D. H. Clifford. Not renewed.
VK7KM—K. G. McCracken. Transferred to Vic.
VK7ZPW—P. G. Waterhouse. Now VK3ZPX.
VK8JM—J. P. Meehan. Transferred to N.G.

"CQ" AWARDS

Amateurs are advised that applications for the "CQ" Awards can no longer be checked by the W.I.A. Federal Awards Manager. Due to an ever increasing work load for local and overseas awards, it is not possible to devote time to the "CQ" awards which are of a commercial nature. To enable more time a be devoted to official Amateur awards, checking of "CQ" award applications has had to cease.

Anyone wishing to obtain information in relation to the "CQ" awards should contact that organisation direct at the following address: 14 Vanderventer Ave., Port Washington, L.I., N.Y., 11050, U.S.A. Application blanks, etc., are no longer available from the Federal Awards Manager W.I.A.

W.I.A. V.H.F.C.C.

New Member:

Cert. No.	Call	Confirmations 52 MHz.	144 MHz.
79	VK5ZNH	107	—

COOK BI-CENTENARY AWARD

The following additional stations have qualified for the Award:—

Cert. No.	Call	Cert. No.	Call	Cert. No.	Call
1322	AX2BLP	1327	G3PHT	1333	OK1ADP
1323	AX3AFI	1328	AX5FL	1334	AX5DV
1324	W9MCR	1329	3Z5BSV	1335	ZL1BKX
1325	G6XN	1330	KH6GKH	1336	AX5ZS
1326	9Q5CO	1331	VE1WZ	1337	W6QFU
		1332	AX3PJ		

W.I.A. 52 MHz. W.A.S. AWARD

New Members:

Cert. No.	Call	Additional Countries
92	VK3AOT	1
93	VK5ZNH	—
94	VK3KC	2

NORFOLK ISLAND DX-PEDITION

You would like a little island of olde worlde charm with few people, rolling hills, duty free shopping and plenty of fishing? About 5 miles by 3 miles, 8,000 acres in all, some tourists and only a short flight from Sydney. Such is Norfolk Island, a separate "country" for DXCC.

Alf Matthews, VK3ZT, flew across in the last week of March to join Larry Pace, K2HXP, and his XYL Lauren, to help with VK9NP activation. Larry is possibly better known for his mobile activities during the past few months as VK8CGB from various centres starting with Darwin and Perth and latterly as VK4CGB.

A very specially warm vote of thanks goes to Ray Hoare, VK9RH, the only resident Amateur operator, for his extremely able and willing help throughout the entire operation. On the DX bands, Ray has suffered manfully for a long time with endless pile-ups and breakers whenever he appears and it seemed a pleasure to transfer the load onto other shoulders for a spell.

The DX-pedition ran for four weeks from 13th March from a QTH in the town of Burnt Pine, using Larry's FT101 with FV101 external v.f.o., TH3Jr tribander, 14AVQ (particularly useful) and 80 mx dipole. Some 8,000 contacts were made including a limited c.w. operation as VK3ZT/9 by Alf. QSLs should go to K3RLY except for Alf's contacts which should go through normal channels.

At the beginning of the period conditions were excellent on the 14, 21 and 28 MHz. bands to such an extent that Lauren could scarcely keep the log up to date and general sleepiness crept in. After the first week a deterioration set in and never really recovered. Alf's c.w. operation began with 70 contacts per hour and tailed off down to 6 or so. Openings to Europe were brief and very few African stations were heard. Many times Larry and Alf were sitting back listening to VK/ZL stations working DX which was totally inaudible on the island. On 80 mx, the openings to VK/ZL were good for short periods only, with high QRN; a few VE and W contacts were made under difficult conditions. On 40, the QRN also was high, but some good contacts in short bursts were made. On the other h.f. bands it was a delight to experience the incredibly low noise level.

Operating practices were generally very good on both s.s.b. and c.w., thanks to co-operation by everybody. One potent-signal c.w. operator persistently broke in for QTH details—ah well, it takes all kinds! His mates will have something to say to him no doubt.

Approvals are now being sought for a visit to Willis Island in early June, followed by a short operation of a few days to Melish Reef in the Coral Sea. The former is a separate DXCC country and it is understood the latter has recently qualified as a new country also. DX hunters, sharpen up on your signals, therefore, as Melish Reef has probably never been previously activated. These two DX-peditions are also subject to transportation arrangements, weather permitting and so on.

Realising that VK9N is still a much wanted country, Alf is planning a return visit to the island next year, probably much to the relief of Ray VK9RH. Thank you for your notes, Alf, and thanks to Larry and Lauren whom I first met in a caravan park in Tehran, Iran, last year whilst the two families were on the overlander caravan trail from Africa and Europe.—73, de VK3CIF.

BUNYIP TALK

HOW ABOUT 100 COUNTRIES WORKED MOBILE TO MOBILE?

HAMADS

Minimum $1 for forty words. Extra words, 3 cents each.

HAMADS WILL NOT BE PUBLISHED UNLESS ACCOMPANIED BY REMITTANCE.

Advertisements under this heading will be accepted only from Amateurs and S.w.l.'s. The Publishers reserve the right to reject any advertising which, in their opinion, is of a commercial nature. Copy must be received at P.O. 36, East Melbourne, Vic., 3002, by 5th of the month and remittance must accompany the advertisement.

FOR SALE: As new Trio TS510 Transceiver plus matching 240v. a.c. mains power supply and matching remote v.f.o. 5D. All facilities and 150w. p.e.p. Suitable v.h.f. transverter operation also. This is latest transceiver from Trio. Mic. with desk stand, connecting leads, plugs, hand books, alignment tool, spare relay and spare set of valves included, $425. Also Yaesu Musen v.f.o. 50B and matching F Series generator board with all relevant ccts., $50. Telephone or telegram Melbourne (03) 20-4329 after hours.

FOR SALE: Complete Station, Swan 350, lattice wind-up and telescope masts, quad spider, antenna switch, co-ax. etc. Sell separately if required. P. C. Goldstone, 7 Pioneer Pde., Banora Point, N.S.W., 2413. Phone 36-3313 STD 075.

FOR SALE: Complete 6 mx s.s.b. station, Swan 250 Transceiver with matching power supply and ext. v.f.o. mod. 210, also 6 el. beam Hy-gain mod. 65B. $375 all carefully packed and dispatched, all in as brand new condition. Heathkit 40 mx s.s.b. transceiver, mod. HW22, with in-built spkr. and p.t.t. mic., plus home-brew 12v. d.c. supply, $75. Ian McCosker, P.O. Box 299, Moree, N.S.W., 2400. Phone 52-2060.

FOR SALE: Heathkit HW23A s.s.b. transceiver, complete with power supply, speaker, microphone, manual and new spare pair 6GE5 finals, excellent performer, mint condition, $275. Low-band AWA f.m. unit comprising separate Tx, Rx and heavy duty 12v. p.s., less xtals, $15. No. 62 Transceiver, 1.6 to 10 MHz., complete with headphones, handset mike, whip antenna and manual, excellent condition, $35. Class C Wavemeter, $10. Lengths of co-ax. cable, valves, transformers, etc. VK3AHQ, 30 Grandview Rd., Box Hill South, Vic., 3128. Phone 288-2024.

FOR SALE: Latest model FT200, only three months old, little used, with p.s.u., $365. TA33Jr. Beam, Stolle Rotator, 45 ft. Telescopic Mast, BN86 Balun, 50 ft. UR67 Co-ax.; in perfect condition, $190. W. Roper, 48 Orchard St., Glen Waverley, Vic., 3150. Phone 232-8492.

FOR SALE: MR3A Carphone, 2 mx, three channels, with crystals. $35. VK3AL, Phone 82-5944 (after hours).

FOR SALE: Receiver, 3.5 - 30 MHz., 16 valves, all necessary functions plus v.g. condition. Must sell soon. Good buy at $70. Phone 232-8433 after 6.00 p.m. (Melbourne).

FOR SALE: STC 4SU and 38U series 50w. Chan. A 6 metre base station less carbon mic. Xtals included and a goer. F.O.R. Cressy, Vic. Approx. 4 x 2 x 2 ft., $25. Pye base station transmitter only, 50w. unit half converted, $15. Phone Melb. (03) 20-4329 after hours.

FOR SALE: TCA 1675 Transceiver, 25 watts, 4 channel. Excellent performer on 2 mx f.m. With crystals for Ch. B and Ch. 4, new Pye mic. and p.t.t. handset. $90 or near offer. J. Brown-Sarre, Buronga, N.S.W., 2648.

FOR SALE: Yaesu Musen FT-DX-100, 12 months old, A1 condition. Never used. Best offer over $450. Ring A.H. (Melbourne) 546-3940.

SELL: Collins 75S3 with additional crystals, $550. AR7 with in-built power supply, $30. VK3 FET 144 MHz. Converter, $25. M. Hilliard, Phone 78-4058 (evenings only). 12 Jarrett St., Campsie, N.S.W., 2194.

SWAN 500C, latest, a.g.c.-a.l.c. Fitted with latest Swan 16-pole filter. This Transceiver is in mint condition. Complete with 240v. matching supply. D10A Astatic mike designed for s.s.b. Vox unit. FL2000B Linear, as new. R. Roy, VK3ADR, Phone 67-4486, A.H. 20-6135.

WANTED: Band-change motors and L-R indicator drive transformers to suit 24 volt Bendix MN26 Radio Compass sets. Transformers are marked T16 or A15064. State price required. Also Vintage Radios complete with Horn Speaker, early 1920's, good price paid, send details. O'Brien, Edgar Rd., San Remo, Vic., 3925. Phone 107.

TWO METRE F.M. *from YAESU*

FT-2F All Solid State TRANSCEIVER

Up-to-date advanced semiconductor techniques. 25 silicon transistors, 16 diodes, 1 SCR, 2 ICs, 1 FET.

The YAESU FT-2F opens the door to noise-free, broadcast quality two meter FM operation. And thanks to repeater stations in operation around the country, the two metre band is no longer limited to line-of-sight communications.

The FT-2F Transceiver is a highly advanced, all solid-state unit complete with an automatic tone-burst signal, with an on-off switch, for repeater actuation. The FT-2F has channel capability of 12 simplex or duplex frequencies. Three channel frequencies are included in the purchase price of the FT-2F. (Sets imported by B.E.S. will have simplex Ch. B and duplex (repeaters) Chs. 1 and 4 with crystals installed and aligned —six crystals.)

Advanced circuit design protects the rig automatically from the damage of transistors caused by antenna trouble, or reverse connection of the power line.

Nothing could be simpler than the operation of the FT-2F. Just select your channel and begin push-to-talk conversation with fellow two metre enthusiasts. A simple meter on the front panel indicates battery condition and relative power output. The meter automatically reverts to S meter operation in the receive mode.

Portable or home-base operation can be achieved with the addition of the optional FP-2 power pack. This AC power pack provides regulated DC power for the transceiver and charging voltage for optional leak-proof re-chargeable colloidal type batteries. In addition, a high fidelity elliptical style speaker is built into the pack. The FT-2F of course has its own self-contained speaker for independent use.

In the event of a disaster causing AC power failure, the FP-2 automatically switches over to DC operation from the battery pack. The battery pack will then provide up to eight hours of dependable emergency communications.

Like all YAESU Amateur gear, the FT-2F comes to you with our 90-day warranty. Plus all the hardware you need to get on the air immediately—mike, connectors, DC power cord and mobile mounting bracket. The special noise-cancelling microphone contains two dynamic inserts connected out of phase to shut off external noise.

If you have ever wanted to explore two metres, the time is NOW! And the rig is the YAESU FT-2F!

FT-2F SPECIFICATIONS

GENERAL:
Frequency Coverage: 144 to 148 MHz.
Number of Channels: 12 Channels (three supplied).
Modulation: Frequency Modulation.
Transmitter Control: Push-to-Talk.
Power Drain: Receive 0.5 amps., transmit 2 amps.
Power Source: DC 13.5 volts, plus or minus 10%.
Dimensions and Weight: 6½-in. w. x 2½-in. h. x 10-in. d.; 4 lbs.
Standard Accessories provided: Dynamic Microphone, Connector Plug, DC Cord—Fuse, Mobile Mount.

TRANSMITTER:
RF Output Power: 10 Watts (high position), 1 watt (low position).
Frequency Deviation: 15 KHz. maximum.
Frequency Stability: Plus or minus 0.001% or less.
Spurious Radiation: At least —60 dB. below Carrier.
Tone Burst: Nominal 2800 Hz.

FT-2F SPECIFICATIONS (continued)

RECEIVER:
Receiver Circuit: Crystal-controlled Double Conversion Superhet.
Intermediate Frequencies: 10.7 MHz. and 455 KHz.
Sensitivity: 0.3 uV. for 20 dB. S plus N/N Ratio.
Selectivity: Plus or minus 15 KHz. —6 dB.
Plus or minus 25 KHz. —50 dB.
Audio Output: 1 Watt.
Speaker: 2 inch Dynamic.

FP-2 AC POWER SUPPLY SPECIFICATIONS
Output: 13.5 volts, 2 amps.
AC Input: 100/115/220/234 volts, 50-60 c.p.s.
Speaker: 5 x 3-1/5 inch.

PRICE $269, inc. S.T., Price and specifications subject to change.

Sole Authorised Australian Agent:

BAIL ELECTRONIC SERVICES

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N.S.W. Rep.: **STEPHEN KUHL, P.O. Box 56, Mascot, N.S.W., 2020.** Telephone: Day 67-1650 (AH 37-5445)
South Aust. Rep.: **FARMERS RADIO PTY. LTD., 257 Angas St., Adelaide, S.A., 5000.** Telephone 23-1268
Western Aust. Rep.: **H. R. PRIDE, 26 Lockhart Street, Como, W.A., 6152.** Telephone 60-4379